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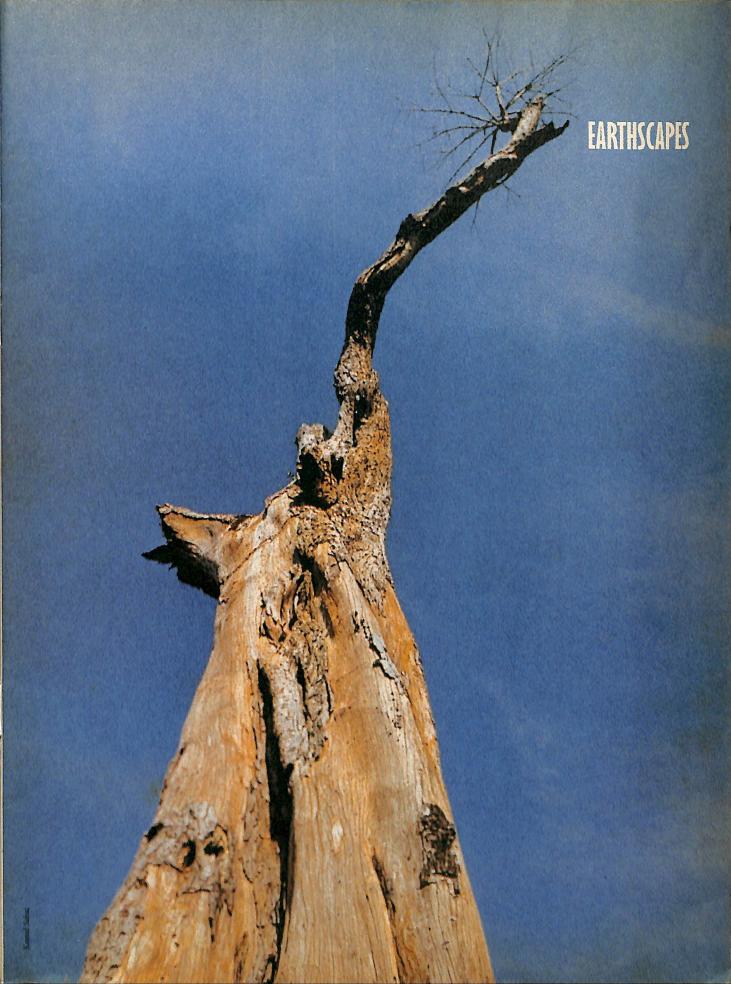
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THE WAS HINDY

Cover: The Kingfisher.
Apart from housing almost the entire colour spectrum within its feathers, it links the three realms on earth: land, water and sky.
Photo by Journa van Gruisen Lotomedia.

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The many and the none Bansuri Taneja and Ashish Kothari

> The age of extinction Ravi Chellam

Biodiversity as a sacred space Yogesh Gokhale

Livelihoods Manju Raju and Madhu Sarin

> Cultivating diversity P.V. Satheesh

Urban biodiversity: Nero's Fiddle? Utkarsh Ghate, Sanjeev Nalawade, Seema Bhatt

Green health boom Darshan Shankar and A.V. Balasubramanian

> Develop and perish? Ashish Kothari

Biopiracy and traditional knowledge R.V. Anuradha

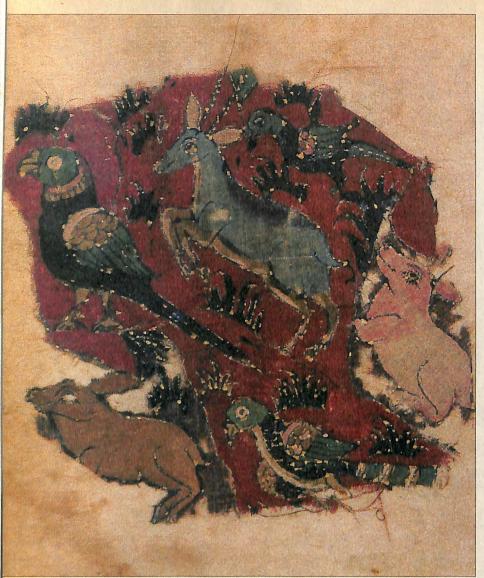
Legal spaces for conservation V. Shruti Devi and Kanchi Kohli

Educating for diversity Karrikeya V. Sarabhai and Sanskriti Menon

> WTO: A right denied Ashish Kothari

Consultant to the issue

Ashish Kothari



The many and the none

Bansuri Taneja and Ashish Kothari

Bansuri Taneja is part of the team involved in developing India's National Biodiversity Strategy and Action Plan. She is currently based in London.

Ashish Kothari is an environmentalist and writer and is with the NGO Kalpavriksh in Pune.

ariety, they say, is the spice of life. How boring if each day were like the other, and how distasteful if we had to eat the same dish every day. We hear the word often, but how often do we think about what biodiversity means to us? In the urban centres of modern India leading middle class lives, a diversity of food is what might bring biodiversity to a level we can understand . . . how would it be if we only had potatoes, or for that matter eggplant, to live on. Or, only one variety of mango throughout India, instead of the several hundreds that one can savour through the few months of summer?

In technical parlance, biological diversity is the variety and variability of life on earth. Expressed as an example that we might be able to identify with, biological diversity is manifest in close to 1000 varieties

Left: Fragment, c. late 16th Century.

of mangoes that thrive in India. It is present in the 14 different kinds of wood we see (depressingly) inlayed to make a wall painting. And if we extend our minds a little more, we should be able to see that it also means the vibrant colours that characterise Holi and Indian clothes, which come (or used to, till synthetics took over) from a variety of dye-producing plants. And, of course, it also means the tiger and the rhino and the elephant, charismatic animals that evoke awe and excitement, and which are used as "flagship" species for conservation programmes. Finally, it also includes the range of natural and human-influenced ecosystems that we live amidst: forests, lakes and rivers, coasts and seas, grasslands, agricultural fields and pastures, deserts, snow-bound peaks . . . even urban areas with vestiges of vegetation and waterbodies.

Perhaps the least obvious aspect of biodiversity is genetic. Variety in what constitutes the basic building block of all life, is also the base of continuous evolution . . . and we should not forget that we humans are a product of the same process, even if we, sometimes in our technological bravado, think we are apart from nature. Diversity in genes also provides the basis for continued survival in the face of new or changing environments. When the number of lions or orang-utans or of



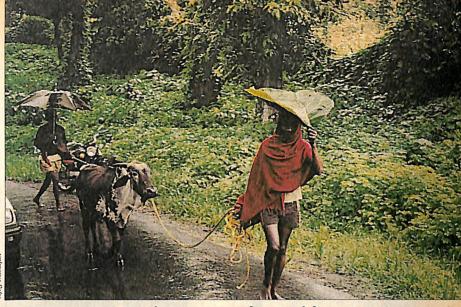
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may 2001

a plant species decreases, these species lose their resilience to environmental changes, or to genetic decay, and eventually succumb. At another level, this fact comes home to us when we realise that vegetables are losing their distinctive tastes, having lost their natural variation and having been doctored to reach the biggest size possible or attain the glossiest exterior. Their genetic diversity is quelled to serve the function of productivity/ yield maximisation, and to suit our increasingly unidimensional view of what "looks good".

Why should we be worried?

The word biodiversity is often heard in connection with how it is fast disappearing. The call has been sounded frequently, that if humanity is not careful we are going to lose the fibre of the planet that makes life possible. Some of us might be familiar with the simile about the ship that is losing one nut at a time . . . each step does not seem to be a significant loss in itself, but lose enough of them and the ship is surely going to sink. We are slowly and surely losing the species and genes that keep the earth "afloat". In time, if we are not able to halt this decline, this ship will sink. There are already signs of this, manifested by a series of global changes in climate, hydrological patterns, and other ecological functions that we all survive on, and by the collapse of global fisheries, the desertification of tens of millions of hectares of onceproductive land, the loss of soil nutrition, and so on. Not all these are caused by biodiversity loss, but



triggering or aggravating these phenomenon.

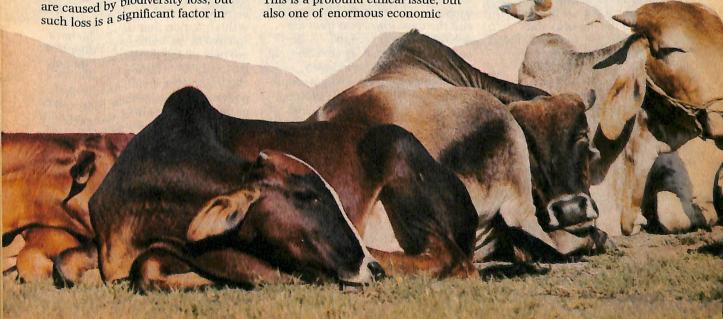
These warnings, as this issue of Folio endeavours to show, are not a moment too early, nor are they unnecessarily alarmist. Biodiversity and its loss are not abstract notions unlikely to affect our generation or the one following. Biological diversity is closely tied in to our lives and identities in myriad ways, some of which have been touched upon above.

As human beings proud of our ability to think and feel, we should

be concerned about the impact that our greed and arrogance in assuming the planet is meant to serve only our needs, is inflicting on the rest of the living world. As is brought out in the article on Extinctions in this issue, our species, one out of perhaps 50 million, is hastening the planet onto an irreversible path of mass deaths. This is a profound ethical issue, but

and material dimensions. One significant aspect of this, a living example of how our own traditions put themselves amidst, rather than apart from, nature is brought out in the article on Sacred Biodiversity.

Though it concerns all of us, biodiversity is most directly related to the everyday lives of India's ecosystem people. Hundreds of millions of small farmers, fisherfolk, herders and hunter-gatherers, a substantial number of them tribal, depend on the diversity of species, genetic varieties, and ecosystem services for their livelihoods and cultural lives. It provides them with their fuel, food, fodder for livestock, housing material, medicine and spiritual sustenance. The loss of biodiversity is a direct attack on their very survival. For this part of humanity, the ship is already



The flip side of biodiversity is cultural – and religious – diversity. Trends that steamroller this plurality are the equivalent of agrimonoculture, and as dangerous.

Below left: A southern tribal.
Below right: A woman from Kinnaur (H.P.)
Right: A mutilated image of God.



sinking. It is these concerns that the article on Livelihoods, Empowerment and Biodiversity seeks to elucidate. Directly related is the article on Health, which brings out the link between biodiversity, medicine, nutrition and the physical and mental well-being of human beings.

It is important to note here that the presence of just any species functioning as a resource is not adequate. It is the diversity of species, of animals and plants and even micro-organisms, that is valuable to rural communities. As Jagat Singh Choudhury of the Kumaon Himalaya, one of the many thousands of ecosystem people, explains: "There should be every kind of tree in the forest, there should be fodder trees, fuelwood trees and those which keep the soil





moist. Banj, kafai, ayar, buraans, will keep our soil humid and their leaves will make humus which will have organic diversity. There should be fruit trees also and trees which will supply wood for building purposes and the most important trees are those which will keep the environment clean: broad-leafed ones. The rest are for industry, rambans, bans, ringal, and grass and creepers other than these. Creepers are the main resources for fodder. What elders say is that earlier there were dense forests and there were many species in them. But now in the monoculture pine forests there is no (diversity) . . . if trees, grass, herbs, creepers, etc. all grow then won't there be economic development?"

Such a view is also powerfully voiced by Dalit women farmers of Andhra Pradesh, as brought out in the article on Agriculture and

Biodiversity. Combining seed diversity, organic inputs, land rights, local markets and cultural traditions. these women have issued a powerful challenge to the monocultural. chemical-intensive, Green Revolution that promised prosperity and brought it too, but for a short period and at the cost of deadened soils, poisoned waters and food, a narrowing genetic base, and suicideprone farmers. Biological diverse farming systems are indeed the future of India's agriculture, not the hi-tech biotechnology that agricultural scientists and corporations are trying to entice us towards. Farmer and other ecosystem communities, empowered with the seeds of self-sufficiency, are also challenging the rampant biopiracy that we face, in which ageold knowledge regarding turmeric, neem, and myriad other elements of biodiversity have been patented in an attempt to make it the exclusive domain of corporate interests. The article on Patents highlights the struggle to protect indigenous knowledge in the face of this appropriation of the ultimate human organ, the mind.

With the forces of commercialisation and globalisation sounding a death knell for many biodiverse areas, there is havoc being wreaked on the lives of people living in and dependent on them. Environmentalists are often blamed for being anarchists or antidevelopment. But if the aim of development is to improve the standard of living for the country's poor, then how can snatching away these people's means of sustenance be possibly called "development"? It is this question that those who have suffered in the name of development are now asking themselves. Not only that, they are resisting and challenging the domination of the powers-that-be over their lives, and questioning the path of economic progress that prescribes such destruction. This crucial challenge. and the alternative models of human welfare that are being successfully tried across India, are the subject of the article on Development. Two strategies towards such an alternative vision are highlighted in the articles on Legal Spaces and Education. As the latter brings out, it is finally only an enlightened public - which does not

Securing India's future

here are two common themes that unite the articles in this issue: the ecological security of the country and the livelihood security of communities dependent on biodiversity and natural resources. These are also the two bottomlines of a unique exercise currently underway: the National Biodiversity Strategy and Action Plan (NBSAP).

A follow-up to the U.N. Convention on Biological Diversity, the NBSAP is a project of the Ministry of Environment and Forests, funded by the Global **Environment Facility through the United Nations** Development Programme. What sets it apart from previous such planning exercises, is that the technical execution of the project has been handed out to an NGO, Kalpavriksh, which has set up a 15-member Technical and Policy Core Group (TPCG) of experts and activists from various fields and parts of India. Administrative co-ordination is being done by the Biotech Consortium of India Ltd.

The NBSAP may be India's biggest ever environment and development planning process, and perhaps one of the world's biggest. In a radical departure from established norm, the planning is starting from several decentralised sources. About 20 local micro-planning processes at village to district levels, 33 State and Union territory level processes, 10 planning exercises for ecological regions cutting across States, will bring a variety of area-specific information and perspectives. In addition, national working groups are preparing action plans on 14 themes, including many of the aspects covered in this issue: culture, agriculture, wildlife and ecosystems, health, technology, laws and policies, education and training, and patents. Each of these processes involves a variety of actors, from farmers and fisherfolk and adivasis to scientists and academics, governmental and nongovernmental organisations, artists, armed forces personnel, the corporate sector, and so on. A series of public hearings, workshops, festivals and exhibitions. yatras, boat rallies, science exhibitions, advertisements and media write-ups, and other such processes are being used to attract maximum public participation. A Call for

Participation, printed in 16 languages, is being distributed in thousands.

Key elements of each of these plans will form the base of the national level plan, which will be written at the end. Each of the plans can, however, be pushed for implementation as soon as ready, independent of the national plan. The entire exercise is supposed to end by mid-2002. It is to the credit of the Ministry of Environment and Forests, and specifically of National Project Director R.H. Khwaja, and the two very hardworking scientists G.V. Sarat Babu and Sujatha Arora, that they have facilitated such a unique process.

The most critical challenge that the exercise faces is to suggest creative ways to influence current development planning and budgeting. The Planning Commission may be setting up a group to especially look at how biodiversity concerns can be built into the formulation of the 10th Plan for 2002-2007. But equally, if not more important, will be the voices and opinions and the very down-to-earth recommendations, of the thousands of ecosystem people who are involved in the process.

The first local level action plan of NBSAP was released on February 17 at a village near Zaheerabad in Andhra Pradesh; significantly, it was a people's plan, put together after a mobile biodiversity festival through 70 villages. The document shows how sustainable agriculture, seed diversity, secure livelihoods, locally sensitive markets, and cultural aspects can be tied together. It is this kind of powerful message, and the combined efforts of scientists, government officials, and activists in putting together a comprehensive picture of biodiversity, that will hopefully make the critical difference.

Readers who would like more information on this process, or would like to take part in it, may visit the website http://sdnp.delhi.nic.in/nbsap, or write in to:

Ashish Kothari, Kalpavriksh, Coordinator, Technical and Policy Core Group, c/o BCIL, Kundan House, 4th Floor, 16 Nehru Place, New Delhi 110019. Fax: 91-11-6219541:

Email: bcil@nda.vsnl.net.in.





























necessarily mean one educated in today's insensitive schooling system - that will make the difference.

And finally, if the readers of this issue, mostly we suspect city-based, still think that they are something apart from biodiversity, there is a piece about Urban Nature . . . just to remind us that we are all connected to the strands of life. As the native American chief Seattle is believed to have said, when all the eagles and fish are gone and the waters killed by pollution, only then will we realise that money cannot be eaten.



The age of extinction

Ravi Chellam

y the time you finish reading this issue of *Folio*, perhaps one more plant or animal species somewhere in the world would have disappeared. Gone forever, never to come back.

Extinction is forever. What is the significance of this pithy little phrase, oft used in conservation circles? Why should it concern us as humans? Anyway, is extinction not part of nature?

Extinction by definition means that no live individual of a particular species exists anywhere in the world, either in its natural habitat (in situ), or in captivity (ex situ). Dinosaurs today exist only in reconstructed models and on film screens. But conservationists do not easily accept the fact that a species has gone extinct. By the strictest definitions for officially recognising that a species has gone extinct, it takes numerous intensive surveys spread over many years, before one can come to this conclusion. In some cases species believed to be extinct will "reappear" after decades . . . remnant populations that no one had earlier chanced upon. On the other hand, new species can be described and added to our knowledge much more easily and in much shorter periods of time.

It is natural for species to go extinct. Life evolved on earth more than 600 million years ago. Many species have evolved and many others gone extinct over these long millennia, a fact revealed to us through fossils. This fossil record enables us to reconstruct the manner in which species have

Below: The only specimens of the Pink-headed duck are in museums.

evolved, and to fix time scales over which certain forms of life were dominant on earth. These have also enabled us to detect that there is a cycle of mass extinctions that takes place periodically in the evolutionary history of the earth. Mass extinctions are defined as episodes when an exceptional global decline in biodiversity takes place, one which affects a broad range of life forms over a short period of time. For example, there could be forest dwelling insects, land dwelling dinosaurs and ocean-bottom dwelling molluscs, all disappearing at the same time. This time scale could be over a few thousand to hundred thousand or million years. which will seem very long in the normal human perception, but is a very short period in the earth's evolutionary history.

Five mass extinctions in the earth's history have been identified: during the Ordovician Era (450 million years ago), Late Devonian (350 million years ago), Late Permian (275 million years ago). Late Triassic (190 million years ago) and Late Cretaceous (65 million years ago). Various explanations have been given for these extinctions, the ones with greatest credibility being the effects of glaciation and the impact of an extra-terrestrial object collision with the earth. Both of these would have had widespread and drastic impacts on the prevailing climate. The sea would have retreated from many areas, the sun would have been obscured for many weeks if not months, by massive clouds of dust, and in general the flow of energy would have been drastically disrupted resulting in the extinction of many forms of life.

extinction. It is important to note that a much reduced number of life forms would have survived these difficult times of mass extinctions, adapting to the gross environmental changes and over a period of time evolving into many more forms or species.

This process of continuous extinction and evolution characterises the history of life on earth. A good example is the information we have on birds. Currently, about 9,000 species of birds survive worldwide. The fossil history indicates that over the last 150 million years, some 1,50,000 species of birds have evolved and become extinct. Yet, it appears that we are today in the midst of the greatest ever diversity of species to have existed at any one given moment.

But not for long. We are again today living in an age of mass extinction. So what? Should we be concerned, given that biodiversity has sprung back from five previous mass extinctions?

The present episode of mass extinction has important differences from previous ones. These extinctions are largely caused by the impacts of one species - human beings. They are taking place over extremely short periods of time, maybe just a few decades or centuries. Human actions have resulted in the widespread loss of natural habitats, fragmentation of the remaining habitats, poisoning of many areas, displacement of uniquely adapted species by exotics. and in general the gross disruption of the numerous intricate natural processes which govern the evolution of species.

The result is that human-induced extinction rates not only far outstrip natural extinction rates but also disrupt normal evolutionary processes. Contemporary species extinction rates are estimated to be 1,000 to 10,000 times higher than the normal background extinction rates expected in the absence of human influences.

The result is that in a short period of time there has been a drastic and





heroic conservation efforts, unless some very drastic changes are made immediately by the human race as a

whole, there is no escaping the fact that most practitioners in the field of conservation will only go down in history as chroniclers of extinctions!

The most quoted example of how dramatic human-caused extinctions can be, is the case of passenger pigeons in the U.S.. In the 19th Century, there are estimated to have been an astounding 2,000 million individuals of this species. When some of the huge flocks flew across the skies, they used to obscure the sun for many hours. Due to hunting and habitat destruction, the population was reduced to 2,50,000 by 1896, and by 1914 the species became extinct with the death of the last bird in captivity. If this is the rapidity and scale of human destruction, we can well imagine what awaits the hundreds of endangered species all over the world. The Asiatic lion population is estimated to be only around 320 in only one protected area, Gir National Park in Gujarat, India's

tiger population is estimated to be about 5,000 and that of the one

biodiversity of the earth. This is not

an alarmist's reaction but a realistic

assessment based on data collected

over the past few decades from all

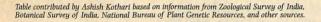
over the world.

Extinctions are probably happening on a daily basis in India, especially amongst some of the smaller and lesser known organisms like insects and fungi. The better known examples of recorded extinctions in India are the pinkheaded duck, mountain quail and the cheetah. In fact, extinction of mammal or bird species is more likely to be recognised than for example, plant or amphibian species.

Estimates of global species richness range from a minimum of 10 million to 30 and maybe even 50 million. Much of this richness is found in tropical countries like India. Only a fraction of the estimated number of species has been described, about 1.2 million. In India, about 1,36,000 species have been listed (see Table), but there are probably at least 3 to 4 times that

Above: Man at daily ritual.

India: A Land of Diversityand Destruction			
Biodiversity Element (indicative examples)	Range Native to India	Destroyed/ Under Threat	
Ecosystems			
Forests	200 types, scrub to rainforest	Approx. 50 per cent wiped out over last century	
Wetlands	8 types, seasonal floodplains to lakes	One-third drained out, 70 per cent polluted	
Agro-ecosystems	20 agro-ecological zones	Mass homogenisation across the plains	
Coasts	Several types of beach, mangrove, coral reef systems	40 per cent of mangroves wiped out; major portion of coral reefs bleached or silted	
Wild species	47,000 plant and 89,000 animal species		
Flowering plants	17,500 species	At least 20 extinct; 10 per cent threatened	
Mammals	390 species	2 or 3 extinct; 20 per cent threatened	
Birds	1232 species	2 extinct; 5-10 per cent threatened	
Insects	57,000 species	No estimate	
Domesticated taxa	167 crop and 10 livestock species; tens of thousands of varieties		
Goats	20 breeds	50 per cent threatened	
Sheep	40 breeds	30 per cent threatened	
Poultry	18 breeds	100 per cent threatened	
Crops	Thousands of varieties of several hundred species	No estimate, but probably in thousands	





Dead Hawksbill turtle in Andaman Islands: a greatly threatened group of animals.

many that are not yet recorded. With the rampant destruction of habitats all over the country, especially of the species-rich tropical forests and coral reefs, we are losing numerous species, many of which might still be undescribed and unknown to us. Some scientists estimate that at current rates of habitat destruction, we may lose upto one-third of the total wild species in the country within the next few decades . . . that is, an astounding 45,000 known species, and probably many more unrecorded ones.

Extinctions are not restricted to wild species alone. Numerous varieties of crops and breeds of livestock have become extinct in India due to the over-reliance on a handful of high-yielding and hybrid varieties. The genetic erosion this represents is extremely serious and threatens the long-term viability of our agriculture and animal husbandry systems.



Above: Hoolock Gibbon in zoo: is this the only place left where we will see them?
Right: The universal brotherhood of man and animal.



Other Land

Of the many initiatives taken to conserve what remains of our biodiversity, the ones that merit mention are the continuation of traditional conservation practices amongst many village communities, the creation of legally protected areas by State governments and the ban on hunting of, and trade in. several species of wildlife. While in themselves commendable, they have been woefully inadequate in halting the decline of biodiversity. A much greater national effort is needed. especially to resolve the basic conflicts between the development aspirations of an industrialising country, and the need to conserve the natural habitats and biodiversity that co-exist with us.

A new national process promises to point towards such a resolution, and help us take a small step towards securing the country's

biodiversity. This is the National Biodiversity Strategy and Action Plan (NBSAP), being formulated by the Ministry of Environment and Forests with execution by hundreds of NGOs, official agencies. community groups, and others (see Introductory piece). As part of this, specialist Working Groups on Wild Plants, Wild Animals, Microorganisms, Natural Terrestrial Ecosystems, Natural Aquatic Ecosystems, and Domesticated Biodiversity, are collating existing information on the status of biodiversity, the major threats to its continuation, and the gaps in coverage of conservation initiatives. From this will emerge a picture of what habitats and species need to focused on for urgent conservation intervention, and what concrete steps would be needed to achieve this.

Below: The One-horned rhinoceros... running its last race?



It is important for us to immediately realise that there are no technological solutions for the human-induced crisis of extinction. If we do not reform our ways, the extinction of life itself on earth may well become a reality . . . and when millions of species go, can we be far behind?

So what if there is mass extinction?



mug as we are in our technological cocoons and monetary illusions, we may think that mass extinction of plants and animals, is of little consequence. We couldn't be farther from the truth. Note the following:

• Oxygen is primarily produced by marine algae, themselves dependent on biologically diverse, healthy seas;

 80 per cent of the world's population depends substantially on plant and animal-based medicines;

• In many communities, over 40 per cent of food comes from

the wild;

• Plants from the tropics are worth between \$5 billion to \$47 billion, annually, to the global pharmaceutical industry (one Indian plant alone, *sarpagandha* (*Rauwolfia serpentina*), is the base for \$260 million worth trade in hypertension and schizophrenia drugs):

• The forests of the tropics, in particular the Amazon, help regulate the earth's climate and hydrological patterns, a benefit whose dimensions are impossible to calculate:

• Seed genetic diversity provides the global agricultural economy with billions of dollars worth of value; one wild rice species from central India provided resistance against grassy stunt virus, saving rice grown over millions of hectares in south and south-east Asia, and one wheat variety from Turkey has provided disease resistance valued at over \$50 million per year;

• Genetic uniformity destroyed the Irish potato crop in 1846, resulting in one million people dying and 1.5 million migrating out; in 1984, similar homogeneity led to bacterial disease amongst citrus in Florida, forcing the destruction of 18 million trees.

More important than all the above is the great ethical tragedy of mass extinction: whatever gave us, just one out of 50 million species, the right to snatch life away from any other species? Surely is the ultimate act of ingratitude, to destroy the very natural conditions that gave rise to us?

But even if we are not moved by moral arguments, it should not take a genius to realise that tampering with the earth's fragile web of life is to invite trouble onto ourselves... yet our species, considering itself to be the most intellegent, continues to do precisely that!

Ashish Kothari



Biodiversity as a sacred space

Yogesh Gokhale

The writer is a doctoral student working on forest management regimes and plant diversity in the Western Ghats of Karnataka.

Indian society is a bewildering mosaic of different traditions and cultures, ranging from hunting-gathering communities like the Jarawas of the Andaman and Nicobar Islands, alpine pastoralists like the Gaddis of Himachal Pradesh, forest-dwelling agriculturalists like the Kanis of Kerala, modern cultivators like the farmers of Punjab, traditional shifting cultivators like the tribes of north-eastern India, and of course a range of urbanites.

Many of these societies or cultures have traditionally developed strategies of conserving and managing nature and natural resources. These strategies were highly congruent to the traditional lifestyle of the respective societies. In many parts of India, local people even now follow several such traditional conservation practices. They include totemism in which one or more species of plants or animals are protected as spiritual ancestors, restraint on hunting female animals, conserving certain species for rituals, keeping aside patches of forests and waterbodies in the name of local deities and so on.

The sacred conservation practices followed by local people have come into focus of late due to their importance for protecting several delicate ecosystems and threatened species, the explicit connections they show between cultural and biological diversity, and their potential of people oriented conservation efforts.

Foreigners who visit India often wonder how significant wildlife populations still exist amid such dense human populations. This can perhaps be partly explained by referring to the widespread traditions of protection and conservation, both at the level of species and landscapes.

Sacred Species

A host of plant and animal species have been traditionally protected, and continue to be conserved in many parts of India. These could be totemic species, a practice in which tribals all over the world consider specific plants or animal or even rivers and mountains as their ancestors, and accordingly protect them. Examples include tigers by the Mushahari clan of the Bodo tribe in Assam, and *Diospyros melanoxylon* (Tendu tree)

by the Gonds of Gadchiroli district in Maharashtra. Or they could be species of ritual importance. For instance, Hindu mythology prescribes *Vratas* i. e. ritual performances for respective deities like Ganapati *vrata*, Lakshmi *vrata* and Nitya Somawara *vrata*. These *vratas* need to be performed by using specific plant species. An interesting compilation by the Karnataka Forest Department describes 19 *vratas* and more than 100 plant species required for these.

Sacred landscapes

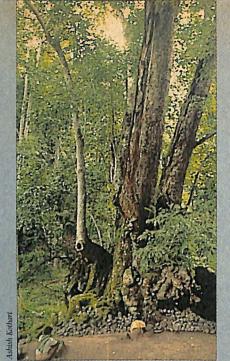
Equally fascinating and significant has been the ancient tradition of conserving a local patch of landscape, or the whole landscape, as sacred. Forests, mountain peaks and hillocks, rivers and streambeds, ponds and grasslands are left aside or their use strictly regulated, due to faith or fear associated with the local deity.

Of these, the most well-known and celebrated are the sacred groves, patches of natural or near-natural vegetation, dedicated by local communities to their ancestral spirits or deities. Such a grove may consist of a multi-species, multi-tier primary forest, or a clump of trees, or even a single tree. These groves are protected through customary taboos and sanctions, with significant cultural and ecological implications; the protecting institution may be the priest, a temple trust, or the community as a whole.

Sacred groves are identified by different local names in different parts of India: kavu in Kerala: devarabana, devarakadu, nagbana in Karnataka; kovilkadu in Tamil Nadu; devarai or devarahati in Maharashtra; in central and eastern India they are jaherthan or sarana; deovan in western India and Himalayan States; in the north-eastern States the names differ from tribe to tribe. In Assam, for instance, the Dimasa call them madaico whereas the Bodo and the Rabha call them than. If there is one biodiversity-related cultural phenomenon cutting across the length and breadth of India, it is that of the sacred grove.

There are other sacred landscapes too that have had an equally important life in the culture of communities. Sacred grazing pastures, often a sparse woodland or a predominantly grassland ecosystem, are a popular practice in western Rajasthan. They are locally called oran. Orans account for eight to nine per cent of the desert area. In the villages of several Himalayan States, especially Uttaranchal and Himachal Pradesh, high-altitude meadows are an important grazing resource. These meadows have been used in regulated fashion traditionally by considering them sacred. In Uttaranchal these meadows are called buqual, and in Himachal, rang. In bugyals people can graze sheep only after worshipping the local deity, usually during July-August. Similar practices are also found in Himachal Pradesh where the festival is called sonechang.

Finally, there are the sacred waterbodies. Portions of streams and riverbeds called machhiyal in Himachal Pradesh and Uttaranchal are protected because of their religious importance. No one is allowed to kill fish from these waterbodies. Fishing is allowed only at a specified distance upstream or downstream. One of the famous machhiyals is the stretch of the Ganga between Haridwar and Rishikesh. Riverbeds in the Western Ghats of Karnataka are also protected for fish at places like Sringeri, a pilgrim centre. Temple ponds in Kerala, Karnataka and Maharashtra too, are given protection for fish. In the Barak valley of Assam, ponds associated with mosques are considered sacred



and fishing activities are totally or partially restricted due to religious taboos.

The future of the sacred

There is no doubt that sacred species and landscapes in India have taken a beating in the last few decades, and perhaps only survive as a fraction of their original extent. Cultural traditions have eroded under the influence of modernisation, dominant Hinduisation has wiped out a variety of adivasi cultures, the younger generation is not as spiritually inclined as their elders.

Left: Sacred tree and grove of the local Soliga tribe inside Biligiri Temple Sanctuary, Karnataka.

Bottom: Not only landscapes, but species also are often considered sacred, such as the Blackbuck

governmental takeover of common lands has weakened community controls, and commercial considerations have undermined cultural and ecological ones. Yet, there may be 1.00,000 to 1,50,000 sacred groves and ecosystems spread across India, and they contain critical populations of some threatened species, provide important refuge to biodiversity that has been driven out of the surrounding landscape, and may serve as an important corridor between larger, officially protected areas. Most important, they provide a continued reminder that human cultures and biodiversity have evolved together, and that encouragement of such a link is likely to be a key element in an ecologically and socially secure future.



Cultural and biological diversity

India ar

Indian society has evolved amidst a physical and ecological landscape of such incredible diversity that it is difficult to grasp. No wonder then, that responding as they were to diverse natural surrounds, human communities across the

country developed such diverse

cultures. The range of languages, rituals, religious and spiritual persuasions, diets, habits and beliefs is bewildering enough to require several anthropologists several lifetimes to even begin to understand.

The relationship between cultural and biological diversity has been two-way, one arising partly as a response to the other, and in turn being nurtured by it. While it would be anthropocentric and incorrect to say that biodiversity in our forests and wetlands survives due to human cultures, certainly it is true that cultural traditions have helped conserve many of them against the forces of destruction, and it is also a fact that in human-influenced systems, we have actually enhanced diversity at a genetic level. For instance, one species of rice has been diversified into over 50,000 varieties, by the so-called "illiterate" farmers. It is not accidental that we call it agri-culture, even though development advocates would like to convert it into agro-nomy, with a search for profits undermining the essential cultural and spiritual bonds between farmers and the land, seed. and water.

Saving diverse cultures is as critical an element of biodiversity conservation, as any other. This requires the revival of community pride in conservation-related traditions, linking such traditions to livelihoods that can survive the onslaught of modernisation, making the education system more sensitive to local ecological and social situations rather than a vehicle for converting everyone into a homogenised "citizen of mainstream India". and educating our decision-making elite and upper classes about the value of biological and cultural diversity.

It is precisely this quest that forms one of the major thrusts of work under the ongoing National Biodiversity Strategy and Action Plan (NBSAP) process. A special working group on culture and biodiversity has been set up, and guidelines have been sent out to various agencies who are working on action plans at local, State, and inter-state levels. In Uttara Kannada district, Karnataka, for instance, a thematic section on cultural aspects of biodiversity is being developed. Residents of the Rathong Chu valley in Sikkim, perhaps India's largest sacred landscape, are working out a conservation and development plan for the entire region, with help from forest officials, NGOs and scientists.

National working groups on agriculture, livelihoods, and education, are integrating cultural aspects as a central thrust. Most interesting is the attempt to bring alive this issue through biodiversity festivals, street plays, puppet shows, yatras, and other folk media. In the Deccan area of Andhra Pradesh, ten bullock-carts were taken through 70 villages on a 35-day journey. during which action plans were made for the revival of seed diversity and its links with secure livelihoods, land use, cultural traditions and organic farming. All these initiatives will hopefully feed into a comprehensive understanding of cultural traditions and practices as related to biodiversity, their current status and manifestations, and the prospects of relinking them to conservation where such links have weakened under the influence of homogenising markets and State policies.



Livelihoods

Manju Raju and Madhu Sarin

The writers are independent researchers and consultants; the former coordinates the Livelihoods, Lifestyles and Biodiversity Working Group of NBSAP, and the latter is on the Technical and Policy Core Group of the NBSAP.



edia obsession with politics, fashion and business relegates stories of the common man's real life struggles to the back pages. The recent killing of three tribals in the police firing in Kashipur, Orissa, for protesting against bauxite mining in the area, and 12 in Takpara, Jharkhand, for their long standing resistance to the Koel Karo dam received very poor media coverage. A little earlier, the custodial death of Col. Pratap Save for leading the fisherfolk's struggle against the construction of Umbergaon port in Gujarat met the same fate.

What inspires these ordinary people to face police bullets, torture and false cases? The answer is simple: the forests, ponds and rivers, coasts, mangroves and fields that stand to be submerged or dammed or mined or drained or polluted, are the very basis of survival for millions of ordinary people. These ordinary, rather extraordinary, people are simply telling the rest of society: lay off, these natural resources and biodiversity are our

ancestral heritage, an integral part of our culture and way of life, what our livelihoods are based on, what we live on.

"Big dams, mines, industry and joining the global market are the paths to development", goes the argument in the corridors of power. Wealth generated in this way will trickle down to the masses and improve standards of living. Actions taken in the name of "public" or "national" interest, however, never allow a say to those whose lives, cultures and livelihoods are torn asunder by such interventions. And where biodiversity conservation gets some (hesitant) official attention, it again does so at the cost of local livelihoods, as a bureaucracycentred model of wildlife protection assumes that only by removing people can nature be saved.

As Dhan Singh of Laata village on the periphery of the Nanda Devi National Park, says: "Oopar bagh aur neechey baandh hamain kha rahein hain" (Higher up the panthers and lower down the dams are eating us up). Dhan Singh's lament is based on 20 per cent of Uttarakhand's geographic area already being brought under the protected area

network, jeopardising the lives and livelihoods of half a million people. The proposed construction of several dams for hydro-power lower down is expected to displace another million people.

Challenging the dominant assumption that the increasing population of poor people is the main threat to biodiversity, Dhan Singh points to the large scale involuntary displacement from the region due to denial of access to livelihood resources. Despite many hill villages being left with less than half their populations, illicit felling and poaching have not declined. If this is the level of disempowerment of rugged mountain dwellers famous for the Chipko Andolan, demanding sustainable management of their forests for local livelihoods in protest against indiscriminate commercial exploitation, what, one may ask, is happening to rural communities in lesser known areas?

People closest to biodiversity point to the continuing role of government policies in the reckless destruction of biodiversity for the commercial benefit of a few. By denying local people their ancestral resource rights, the policing model



The setting sun over an unmanned fishing vessel. Over 10 million fisherfolk in India depend on marine and freshwater biodiversity.

of conservation alienates and disempowers the best potential allies of conservation by pitting them against protected area authorities. Pathetically short of staff and resources, wildlife staff can hardly succeed in warding off powerful global market interests surrounded by alienated and embittered local resource users.

The problem is not a simplistic proposition of "people" versus "wildlife". It is rooted in the complex interplay of divergent interests driving the actions of different groups and people. The same villagers who earlier protected biodiversity in sacred groves can be driven to destroying it for earning wages if their sources of livelihood are snatched away. Commercial interests from the Indian mainland are enticing and compelling tribals in the North-east to sell off their rich forests, and poaching gangs are able to win over villagers, alienated by conservationists and neglected by development agencies, to help track down bears and tigers.

The country's network of water bodies, intertwined with lakes, canals and rivers leading to the sea, harbours rich biodiversity, on which about 22 million fisher-people depend. Yet, be it aquatic conservation policies, or economic development for the global market, the livelihoods and priorities of these people are not taken into account. Fortunately, mobilisation of millions of fisherfolk by the National Fishworkers' Forum to protest against destructive commercial trawling and intensive aquaculture, has brought national attention to this neglected sector.

The oft-derided Jhum or shifting cultivation systems incorporate maintenance of rich agrobiodiversity. Swidden farming by the Angamis in Nagaland, for example, involves the cultivation of 15 to 60 crop species, pest control through multi-cropping and spreading the availability of diverse foods (and the associated requirement of labour) over several months of the year. It has been called a "female farming system" as sowing, manuring, weeding, seed selection and storage are all done by women while men do the tree cutting, clearing and burning of the jhum plot. Yet a government project aimed to replace this farming system with one officially considered more

"sustainable" by working only with men. Such interventions not only belittle women's rich knowledge of agro-diversity but lower their status and control over household food security. In contrast, the empowered Dalit women and men farmers of Medak district in Andhra Pradesh understand and celebrate the value of agro-diversity for food security and control over their lives (see article on Agriculture, in this issue).

The social importance of biodiversity not only in officially protected areas but across the entire landscape, is demonstrated by increasing attempts by local women and men to nurture ecosystems back to health. Between 6,000 to 8,000 villages in Orissa alone are engaged in self-initiated community forest protection. In the hills of Uttaranchal, village women and men are resorting to offering adjoining forests to devis or devtas to ward off greedy land speculators.

olio

A cluster of 35 villages in Kudada, 12 km from Jamshedpur in Jharkhand, have regenerated their totally degraded forests from zero to 100 per cent cover.

The symbiotic relationship between people and nature has also generated rich indigenous knowledge. Para-veterinarian programmes for village women have been startled by the large numbers of herbs, barks and other plant parts traditionally used by women (responsible for cattle care) and local vaids for treating cattle ailments. Thousands of plant and animal species are used for thousands of different uses across India.

Practices for careful balancing of conservation with sustainable use also abound (see Box). Hill women carefully lop the trees nurtured on field bunds for fodder, firewood and fibre, maintaining plant health while maximising yields. On the outskirts of Dalma Wildlife Sanctuary, some adivasi villagers have adapted their traditional annual hunt (otherwise distorted by adivasi youth "educated" outside the community) for monitoring the floral and faunal regeneration in every nook of their community protected forest.

Unfortunately, even official "participatory" programmes are often blind to the interests of the

poorest women and men. The Joint Forest Management (JFM) framework has till recently assumed that the primary incentive required to make villagers participate in forest protection is money or timber shares.

Walking through the regenerating forests in South West Bengal, however, opens up a totally different world view. The women of one Forest Protection Committee excitedly pointed out at least 50 varieties of leaves, climbers, creepers and roots they use for food, fodder, medicine, fibre, fuel and income. Ironically, when the sal poles are harvested for income sharing, this biodiversity gets badly mauled by the official timber-focussed and biodiversity-blind "scientific" silviculture. Many self-initiated forest protection groups in different States have refused to participate in the government's JFM programme, as felling the forest and sharing timber with the Forest Department is simply not acceptable to them. In Mendha (Lekha), a small Gond village, nestled in the forests of Gadchiroli district. Maharashtra, adivasis have rejected official silvicultural methods, and on their own protect 1800 ha. forests, created study circles to gain better understanding of a host of issues, started savings

schemes, initiated non-violent honey collection . . . and increasingly, moved towards tribal self-rule.

These examples point to the potential for developing approaches that integrate conservation and livelihood security. The challenge lies in developing a holistic framework for promoting biodiversity conservation based on principles of democracy, equity and genuine empowerment of the primary stakeholders. This is not to suggest reverting to a mythical idvllic past or rejecting development. Resource dependent women and marginalised groups must be empowered to gain a greater voice in decentralised selfgovernance institutions practicing participatory, rather than "representative" democracy. A start can be made by moving towards joint and community-based management, under which customary rights and equitable benefit-sharing becomes a basis for communities and officials to work together towards biodiversity conservation.

This is one of the main thrusts of the ongoing National Biodiversity Strategy and Action Plan (NBSAP), a Government of India programme that is being executed by NGOs and others in an extremely participatory manner (see Introductory essay).

Of Adivasi rights



he destruction of biological and cultural diversity across the world has led to an increasing realisation that traditional cultures, in particular indigenous and tribal peoples, may well provide answers for the future.

This feeling was clearly manifested in a national workshop on "Biodiversity and Adivasi/Indigenous Peoples", in New Delhi between January 29 and 31 this year. It was organised by the All India Coordinating Forum of Adivasi/Indigenous Peoples, in association with Kalpavriksh, and the ongoing National Biodiversity Strategy and Action Plan (NBSAP) process.

About 85 representatives of adivasi/indigenous communities, and support organisations, from all the

Left: Many tribals are forced by circumstances to find work as migrant labour because of lack of access to retributive justice.

regions of India, came to the following major conclusions:

Adivasi peoples are severely threatened by the forces of globalisation, especially by their usurpation of adivasi lands and resources, often with the aid of the government. "Development" projects in "national and public interest" destroy livelihoods and biodiversity. and adivasis resolve to struggle against such projects. In this context, adivasis strongly warn the Government against recent moves to amend the Fifth Schedule of the Constitution, and denotify parts of Schedule areas to hand over lands to foreign capital and their agents.

Adivasi/Indigenous peoples strongly reject the notion of intellectual property rights, including patents, on life forms, and on knowledge relating to biodiversity. All such knowledge must be in the public domain, and indigenous knowledge must be protected through appropriate community rights systems.



A specialist thematic working group is formulating an action plan on securing livelihoods through biodiversity conservation and use, and various agencies at local and State levels are preparing detailed, micro-level plans for the same. A recent workshop on adivasis and biodiversity, brought together 85 adivasis and supporters to discuss these issues. The results of all these exercises will feed into the national action plan, and hopefully influence governmental policy to be more sensitive to biodiversitybased livelihoods.



Far left: Ratnamma Olgole from Deccan Andhra: women's empowerment is the key to integrating conservation and livelihoods.

Left: Strong people's mobilisation based on livelihood links to the forest, has saved large patches such as this one in Mendha (Lekha), Maharashtra.

Biodiversity conservation – a way of life for the Irulas

he Irulas are a semi-nomadic tribe of hunter-gatherers in Tamil Nadu known for their skills of catching snakes and treating snakebites. High dependence on biodiversity for survival has made them acutely sensitive to their local environment, making conservation a way of life.

In the words of Irula women and men, "On entering a forest, we first look for medicinal plants as they are our means of sustenance. We then look for snakes...and then other animals (rats, rabbits, mongoose, cats, etc.) that we can catch for food and money. We use 36 different plants for treating snakebites. We identify them by keenly observing the animals, such as the mongoose, that use them. Similarly, we identify snake species and their burrows from their tracks, droppings and skins.

"We only hunt older rats and rabbits and while collecting termites, always leave some in each mound for them to re-grow. Similarly, we never remove all the roots of a plant while collecting roots and even replant the tops of the ones we remove.

"The medicinal properties of some plants have received so much publicity that they have become endangered. To protect such plants we have codified their use in our folk songs and we even spread myths about their being useless!

"While moving through our forests for hunting and gathering for a livelihood, we also carry seeds from one forest into another. Yet, we have to hunt stealthily since the law does not allow it."

As recorded by Manju Raju

All developments in technology, including biotechnology, should conform to the principles of biodiversity conservation, ecological safety, security of the people's livelihoods, and control by commodities over means of life and livelihood. Modern genetic engineering was therefore unacceptable.

The current model of protected areas (PAs), while useful for wildlife conservation, was considered a threat to livelihood rights. A new model was needed in which traditional resource rights and central management role for communities were accepted along with biodiversity conservation principles.

The continued repressive measures adopted against adivasi people were to be condemned, and all black laws to be repealed, including the Armed Forces Special Powers Act in the North-eastern states, and the new Madhya Pradesh State Areas Security Act.

The principle of participatory local self-governance should be

vigorously pursued, including the full implementation of the Panchayat (Extension to Scheduled Areas) Act 1996.

Highly endangered adivasi peoples, such as Birhors, Jarawas, and Onges, must be given special protection.

The Biological Diversity Bill 2000 could become a powerful tool for the conservation of biodiversity and the protection of adivasi livelihoods, if it incorporated: stronger provisions for prior informed consent of communities before accessing their biodiversity and knowledge; endorsement of the principle of consensus decision-making through the gram sabha; locus standi to citizens to approach the court under the Bill; the same stringent requirements for Indian corporations and institutions as were put on foreign entities; dropping the exemption given to plants registered under Plant Varieties Protection Bill; recognition of all common property resources as belonging to gram sabhas for the purposes of benefit-sharing; and

inclusion of adivasi representatives on the National Biodiversity Authority and State Biodiversity Boards.

Participants also appreciated the participatory thrust of the Government of India's National Biodiversity Strategy and Action Plan (NBSAP) process, and emphasised that the NBSAP would be relevant only with the informed and full participation of self-governance institutions of adivasi/indigenous peoples, at various levels.

As follow-up, the participants offered to organise similar workshops at regional levels, and disseminate literature on various relevant topics in local languages. Greater networking amongst adivasi/indigenous groups was also felt to be critical. The NBSAP coordinating teams offered to build the main recommendations and conclusions into the action plan process, so that adivasi voices can inform national level policies and decision-making.

Contributed by Khelchandra Singh and Gam Shimray ational and international debates on agriculture are increasingly talking of a new buzzword: agrobiodiversity. What is this? Why is it practiced, and by whom? Why is it declining? To whom should we go to understand this?

Make a departure from those taking part in these debates. Don't go to the great scientists in their white coats in their sterilised labs. Don't consult huge tomes in imposing libraries. Don't surf the net. Instead, go to the real repositories of agrobiodiversity on their farms and peep into their knowledge and cultures.

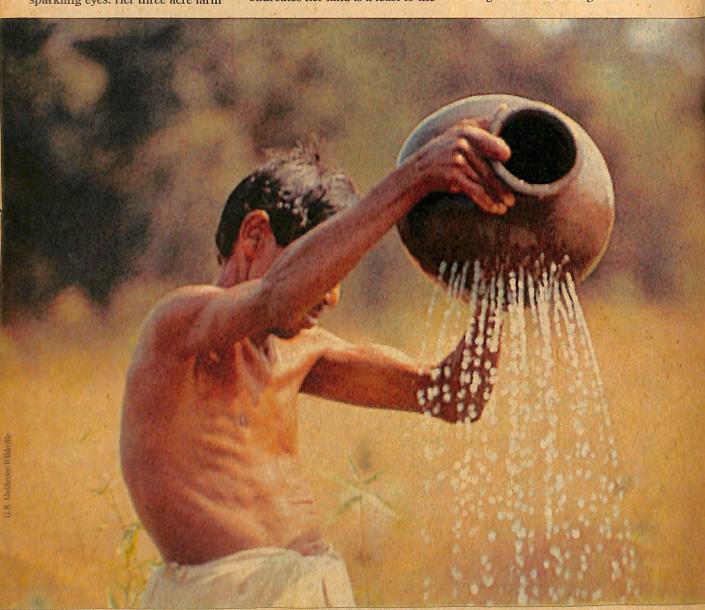
Come and meet a beautiful woman. Gangwar Manemma, 65. A wiry 5ft 2in woman with sparkling eyes. Her three acre farm in village Gangwar in Nyalkal Mandal of Medak district of Andhra Pradesh epitomises the term land degradation. It is a piece of land bestowed upon her by the benevolent government under its land reforms programme. This land could have been a nightmare for any farmer.

But Manemma does not think so. What a "piece of degraded land" is, for the scientific community, is "Bhootalli" (Mother Earth) for Manemma. As if in response to this infinite faith she has in Mother Earth, her most degraded land has never failed to shower her bounties; her family of six has never been hungry in the worst of drought years.

A walk down the little path that bifurcates her land is a feast to the



senses as you are greeted by an incredible 20 odd varieties of crops. Four varieties of jowar in their diverse shapes (round, cone shaped, elongated) and colours (pure white, red, black and yellow) stand in solidarity with four varieties of pigeonpea – black, red, white and spotted. Panicles of foxtail millet – many varieties – nod in the wind while the creeping cowpeas carpet the ground with their green.



Left: Gangwar Manemma Right: Laxmamma

Multicoloured flowers of Dolichos dazzle your eyes while their vines climb up on jowar stalks. The dark red of the finger millet makes a velvet canvas on the earth rising above the spread of creeping green gram.

But it is not the aesthetics of her farm that should strike you most. What should is the principle on which she has created this farm. What she follows, intuitively, is a canon called agrobiodiversity, what many scientists now believe to be critical to the survival of farming.

Another fact that should strike you is that Manemma has produced every single seed she needs in all her 50 years of farming. She epitomises another principle some of us in India are fond of espousing, but as "educated" people fail to achieve: self-sufficiency in the basic elements that constitute survival.

Self-sufficiency is also the motto in the farming of Begari Laxmamma (32), a Dalit single woman from Humnapur in Medak district in Andhra Pradesh. With just one acre of rainfed farmland, she has helped to retrieve and save over 62 varieties of seeds. For Laxmamma, seed is a manifestation of her personal liberation. Control over seeds gives her the freedom of not having to go to the market for seeds.

For Laxmamma, diversity in agriculture is crucial. It brings her a variety of foods which are safe to eat and meet her divergent needs (cereals, pulses and oilseeds) and a range of fodder for her cattle. If she compromises on her principle of biodiversity, she will lose these advantages. She does not believe in the now dominant viewpoint that you can grow a single crop, sell the produce, and purchase your food from the market.

On the hills of Garhwal in Uttar Pradesh, farmer Bachan Singh organises his five acre slopy farm into a neat set of terraced fields. On the lowest patch which has fertile and moist deposits of fine soil, he grows jowar, maize and mustard. On the topmost parts of his field, where land is gravelly and eroded, he sows ragi (finger millet) which



Cultivating diversity

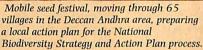
P. V. Satheesh

after year. Between these two heights he grows dozens of crops: buckwheat, barnyard millet, a variety of ramdana (amaranthas), pearl millet, foxtail millet - all a part of the highly evolved Baranaja ("12 crops") system. Elsewhere, his fellow farmers have been fast losing out on this multi-cropping system under the onslaught of the market oriented, monocultural farming (such as sovabean). Of late, however, a group of farmers grouped under the Beej Bachao Andolan (Save the Seeds Campaign) have begun reviving Baranaja.

In the Deccan, women sing a chorus "Aadolla Bhoomillo Pannendu Rakhala Panta" ("on the women's farms twelve crops"). In Puri in Orissa, deities are supposed to be offered several dozen different crops taken from a close radius around the temple, which ensures that such diversity is grown in farmers' fields. Festivals in which the seed as giver of life is celebrated, are commonplace all over the country. These are but a few examples of how farming is indeed, agriculture . . . or was, till the Green Revolution came along.

Why are these farmers, from the heights of the Himalayas to the plateau of the Deccan, from the slopes of Nagaland to the plains of Rajasthan, interested in cultivating

gives him a bumper harvest year



fields? Why do so many, especially among the poorest and smallest farmers, continue to struggle against State policies that aggressively promote a monoculture (single cropping) system? There are several reasons for this:

* Diversified crops maintain soil fertility. Crops are planted in such a way that if one crop draws upon soil nutrients, another crop puts it back into the soil.

* Diversity optimises soil management in rainfed belts. Here soil depths vary considerably within a farm. Farmers adapt: one part of the farm hosts a crop whose roots reach deep into the earth whereas in another part, crops whose roots spread on the upper layer of the soil may be planted.

* Diversity means insurance against crop failure. If one crop fails there is another crop to fall back

* Diversity optimises labour availability. Different crops are harvested at different times of the year and there is no pressure on all the labour to be available for harvesting at one time.

* Diversity ensures food security. At any time of the year, some crop is ready for harvest and therefore supplies food into the kitchen.

* Diversity of a range of foods ensures nutritional balance.

* Diversity provides a range of fodder to the cattle keeping them healthy and productive.

* Diversity helps women control

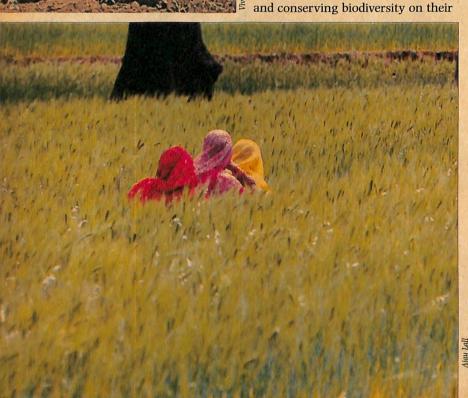


Below: The Dangi breed of cattle,

adapted breeds.

Maharashtra, one of the many superbly





their farm economics and seeds, since such locally adapted seeds are not available in the market.

* Diversity is the most ecologically sustainable form or agriculture.

The list can go on and on. But then, why is such a strong and rational system disappearing from our midst?

This question was posed to over 18,000 farmers in the Zaheerabad region of Medak District in a unique Mobile Biodiversity Festival, conducted as a part of the ongoing National Biodiversity Strategy and Action Plan (NBSAP) process. As part of this festival, initiated by the grassroots NGO Deccan Development Society, a caravan of ten decorated carts carrying diverse traditional seeds, with cultural and religious themes based on biodiversity, rolled from village to village. At each village, there was a burst of frenzied cultural energy not seen for a long time in this region. Looking at the seeds was an emotional catharsis for many farmers. One woman collapsed crying and said, "These were the very seeds I used to farm with. They have been snatched away from me. Now that they have come back I can die peacefully tomorrow."

Below: Dalit women bring traditional seeds for a mobile biodiversity festival.

Right: Farmers in Pastapur, Andhra Pradesh, taking a pledge to protect their indigenous farming system against the invasion of WTOinfluenced policies and products. People singularly blamed the government and the market for destroying their vibrant farming system. Their agriculture, seeds and knowledge were

* Marginalised by the market

* Rejected by the lending policies of the government

* Dubbed as primitive by formal scientific institutions

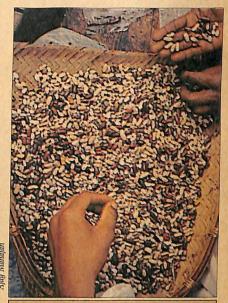
* Given no space by the media. The forces of modernisation and globalisation had released such an onslaught on their system that made it difficult to survive. In the face of this savage attack, people like Manemma, Laxmamma, Anjiah, Bachan Singh and others hold on to this life-saving form of agriculture. They are the heroines and heroes of Indian agriculture. If this nation has a sense of honour, it should stand up and salute them. And help them and millions of others of their ilk to protect the only agriculture which can ensure food, health and hope for this country. One hopes that the ongoing NBSAP process, of which agricultural biodiversity is a critical component, can bring adequate attention to bear on this burning



subject.



Below: A farmer's movement to conserve biodiversity in the Uttaranchal Himalayas, the Beej Bachao Andolan, an offshoot of the Chipko movement, has collected more than 100 kinds of rare rajma (kidney beans) alone, alongside numerous other indigenous neglected crops and varieties.



India's mega diversity

ndia is classified among the 12 mega-diversity centres of the world, in relation to crops. As many as 167 species of crops, 320 species of wild crop relatives, and several species of domesticated animals, have originated here. The genetic diversity within these species is astounding. Some examples:

50,000 varieties Rice: Mango: 1000 varieties Sorghum: 5000 varieties Pepper: 500 varieties Cattle: 27 breeds 22 breeds Goats: 40 breeds Sheep: Poultry: 18 breeds Buffalo:

8 breeds (the world's total diversity!)

This amazing diversity is not a freak of nature, but a result of careful selection and even crossbreeding, over centuries, by India's farmers and pastoralists. The same ones that our decision-makers today term "illiterate and ignorant".

Ashish Kothari

Based on information from the National Bureau of Plant Genetic Resources, National Bureau of Animal Genetic Resources, Central Rice Research Institute, and other sources.

Urban havens: Nero's fiddle? Utkarsh Ghate, Sanjeev Nalawade, Seema Bhatt Utkarsh Ghate is Secretary, RANWA; Sanjeev Nalawade is Lecturer, Ferguson College, Pune; and Seema Bhatt is an independent biodiversity consultant based in New Delhi.

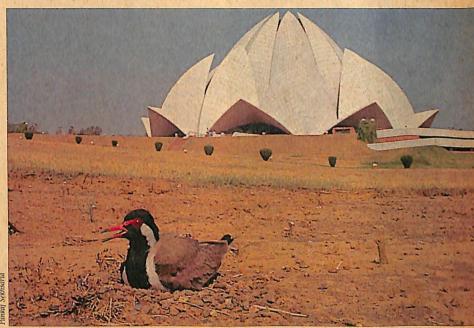
The irony

rban biodiversity – what a misnomer, one might think. Not quite, for a closer look reveals that India's burgeoning towns and cities actually harbour a variety of habitats: waterbodies, parks and gardens and forests. Some have old monuments and wonderful old trees. This mosaic attracts a host of species by providing appropriate places to inhabit, food and water the year round, or even by providing garbage dumps that attract scavengers such as vultures.

A checklist of birds in Delhi reveals over 400 species, one out of every three bird species in the subcontinent. Pune shelters over half the species of higher animals recorded from the entire Deccan plateau. Such high diversity in a relatively small expanse, can partly be attributed to the location of some cities in the transitional areas of various biogeographic zones.

Mumbai's biodiversity is a product of the confluence of the Arabian sea to the west and the Western Ghats to the east. Pune is situated between the dryland plateau to the east and the wet Western Ghats mountains to the west, accounting for its high mammalian and fish diversity. The Himalayan influence on one hand and that of the desert on the other, probably explains for the high diversity of birds and fish in Delhi. A few cities, such as Mumbai, Chennai, Chandigarh, and Bhopal, even have officially declared wildlife reserves, cheek by jowl alongside skyscrapers. Chennai, Mumbai, and

Below: A lapwing nesting in the Bahai temple environs, Delhi. Some wildlife is highly adaptable.



A forest within a city



Amidst the teeming millions and cacophony of traffic of Delhi, stands a tranquil, dense forest popularly known as the "green lung" of the capital – the Delhi Ridge. Delhi has the distinction of being

one of the few metros in the world that possesses a city forest. An extension of the Aravalli hill range, the Ridge forest spreads over almost 7,800 hectares. Surprisingly, this forest is not entirely "natural", with extensive plantations having taken place since 1847. Today, the Ridge is a mix of native and exotic plants, but still retains its semi-arid scrub vegetation characteristics. Up until the early part of the last century, animals like the Blackbuck, Nilgai and Chinkara roamed this scrub jungle. Rapid urbanisation and habitat degradation have taken their toll and over the years the Ridge has lost most of its big mammal population, with only the occasional hare or jackal still left. The area, however, still remains a birdwatchers' paradise, with almost 200 species being reported. The Ridge performs several ecological functions for Delhi. It acts as a giant sponge to air pollutants, and as an air-conditioner. So effective

is this that one can feel a perceptible drop in temperature even while passing by it at the peak of Delhi's summer. The Ridge is also a live laboratory, and has inspired and nurtured many aspiring naturalists by teaching them the rudiments of ecology.

The Ridge is, however, rapidly shrinking, falling prey to construction activities, conversion of forests to parklands, encroachments and garbage dumping. In 1979, about 300 students and concerned citizens organised a rally, led by the NGO Kalpavriksh, protesting against the Delhi Administration's plans for construction work on the Ridge. As a result of this effort, a large portion of the Ridge was declared protected. However, the legal protection given was weak and encroachments continued, including by the government itself. But so did citizens' protests. In 1993, NGOs working on the issue came together as the Joint NGO Forum to Save the Delhi Ridge Forest. Pressure from the Forum and other concerned citizens finally led the Delhi Administration to declare, in 1996, the Ridge as a Reserve Forest under the Indian Forest Act 1927. However, there is no time for complacency. The Ridge is a unique showcase of urban biodiversity and has to be strictly protected. A portion of the area, declared the Asola Wildlife Sanctuary, needs to be conserved in collaboration with the villagers living in and around it. Finally, the future of the Ridge will be secure only if the citizens of Delhi care enough and continue to fight for its survival.

Seema Bhatt

Right: Forested hill, Pune, the scene of an ongoing battle between environmentalists and urban developers.

Below: Notwithstanding the fact of some urban efforts at greening, one of the key factors at biodiversity loss in other areas has been urban consumerism, à la Shahtoosh.





Vishakhapatnam contain important coastal habitats, with mangroves, sea turtle nesting sites, and other interesting flora and fauna.

The recognition and understanding of urban biodiversity is not new. Major General H.P.W. Hutson's The Birds About Delhi was published in 1954, followed by another book on birds by Usha Ganguly in 1975. The great ornithologist Salim Ali recorded, in his small patch of garden in the middle of Mumbai, the same migratory species of birds coming for several years running. The Zoological Survey of India has recently published a thick professional compilation on the entire faunal wealth of Delhi, WWF India has published a checklist of the fauna of Bangalore, and experts have documented the rich diversity found in the Kolkata Salt Lake wetlands. In Pune, the Ecological Society and Research and Action in Natural Wealth Administration (RANWA) have published an assessment of species diversity in various zones of the city. Studies and publications on plant diversity, on the richness of parks and gardens. and other aspects of the vegetation of cities, abound in India.

Urban biodiversity varies with habitat types and human impact levels. The diversity of fungi, herbs and trees, for example, seems to be as much or more in human impacted habitats than in low impact zones. But the diversity of sensitive organisms like fish or birds tends to be lower in impacted habitats. Although urban areas maintain considerable biodiversity, unique or rare species may often be replaced by more stress tolerant species such as crows and mynas. The conversion of old houses into skyscrapers has often triggered loss of populations of squirrel or snakes or civets. Conversion of old growth wilderness areas to manicured parks may result in many bush-dwelling or tree-nesting species disappearing.

Alarm call

For the last few decades, urban areas have been expanding at an average rate of a kilometre and a half a year, encroaching surrounding agricultural lands and forests. The most affected ecosystems have perhaps been riverine vegetation, grassland and scrub. Many cities today host over a million vehicles, requiring ever-expanding roads and spewing out immense pollution. Studies reveal the local extinction of nearly half the fish species recorded earlier from Pune's environs, as a result of haphazard urban growth.

Destruction of urban biodiversity is not only a matter of aesthetic loss. Natural habitats provide fresh air lungs, sinks for air and water pollution, buffers against maddening noise, natural air-conditioning in the blistering summer, critical hydrological functions, and of course a quiet refuge for the citizen tired of a stressful existence. If one were to quantify these benefits, they would easily run into thousands of crores of rupees. Take just one example: a substantial part of

more of the good life

Mumbai's drinking water supply comes from reservoirs protected by urban forests like Borivali . . . where would its citizens be without this?

But with growing urbanisation and the demand for more housing, transportation and so on, does urban biodiversity stand a chance? The answer to this may be positive, if urban dwellers appreciate the natural wealth that they have within their immediate environs. Urban dwellers have become increasingly aware of wildlife and biodiversity in the countryside, but ironically very few of them realise that the very "wildlife" that they seek after travelling several hundred kilometres may sometimes be found in their own backyard.

The first task is therefore of education and awareness, both of the extent of biodiversity and of its important role in our lives. Nature clubs and residents' associations need to encourage short trips to urban havens of biodiversity to inculcate love and respect for the same. This will in turn generate action. Citizens can put pressure on the administration to plant appropriate tree species, or to ensure that biodiversity conservation is an important consideration in urban development plans. An innovative exercise carried out in a number of cities is a tree census, which gives a good idea of the diversity and number of trees, and changes in

these parameters over a period of time. In many cities, protection by local authorities, coupled with the vigil by nearby residents, has facilitated regeneration of natural plants and revival of native fauna such as birds and butterflies. Even seasonal puddles formed in these areas, harbour moults of dragonfly nymphs, indicating ongoing colonisation and establishment of even organisms that are highly susceptible to seasonality. Increasing tree cover of suitable species in the Rajneesh Park at Pune, may have helped predominantly Western Ghats butterflies such as the Blue Mormon, seldom seen in the city earlier.

Citizens' efforts

Citizens can do a lot towards the protection of their immediate environment. Delhi's wonderful Ridge forest today survives because of citizen protests and vigilance (see box). Chennai's turtle nesting sites have long been protected by the famous "turtle walk" initiated by students and young professionals. Kolkata's wetlands at least partially survive because of a number of NGOs, and resistance against concretisation by traditional fisherfolk who depend on them for livelihood. Many small groups have triggered locality specific data literacy. Prakriti Samsad, a birdwatcher's group in Kolkata, has been monitoring the bird population in the city. Similarly, the NGO Kalpavriksh has carried out monthly bird counts across Delhi for over a decade. Students from Pune University have initiated monthly monitoring of the living wealth of their campus, and the nearby wetland at Pashan. Many urban administrations have also responded positively. by declaring protected areas, enacting legislation like Urban Tree Acts, and integrating some biodiversity concerns while making their master plans.

The recently initiated National Biodiversity Strategy and Action Plan (NBSAP), a Ministry of Environment and Forests project that is being technically executed by a group of NGOs and government officials, re-emphasises the importance of urban biodiversity as a component of the nation's environmental security. Several plans focussing on urban areas are being developed under the NBSAP. The Vidarbha Natural History Society is putting together a plan for Nagpur as an ecocity. The Delhi, Chandigarh, and Pondicherry plans will also focus on various aspects of urban biodiversity. Hopefully, with this and other renewed efforts, the neglect by urbanites of nature that is closest to them, would change to an enlightened model of urban development in which non-human creatures also have pride of place.





Green health boom

Darshan Shankar and A. V. Balasubramanian

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he words of a tribal song say: "I love the forests, they keep me, my animals and my fields healthy . . ." Biodiversity and health are intrinsically linked. This link can be clearly seen, firstly, if we understand the basics of biodiversity itself. A variety of life forms exist and flourish across diverse ecosystems: mountains, coasts, seas, forests, lakes and rivers, and so on. Millions of species of plants, animals and microorganisms exist in a "healthy" way in their own natural habitats. Health is therefore implied in the very "existence" of biodiversity.

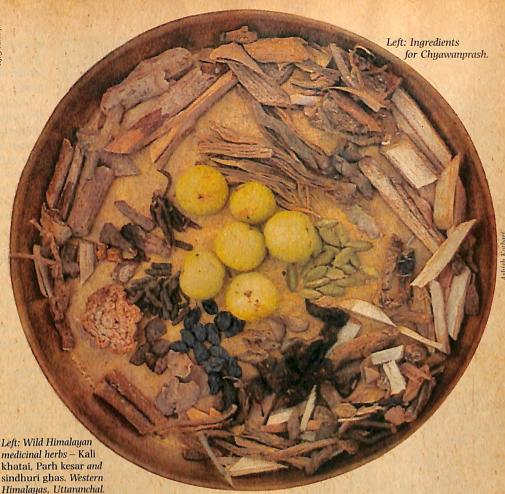
From this simple yet powerful principle, flows an understanding of the relationship of biodiversity to human health.

Biodiversity-based health traditions

From 1986 to 1996, an All India Coordinated Research Project on Ethnobiology was carried out by the Department of Environment of the Indian government. This project concluded that tribal communities alone (who constitute only a small percentage of our population) use over 9,000 species of wild plants, of which the single largest use category – medicinal plants – number over 7,500 species. Besides this, 3,900 are for edible use, 700 for material and cultural requirements, 525 for fibre and cordage, 400 as fodder, 300 as pesticides, 300 as gums and dyes, and 100 as incense and perfume.

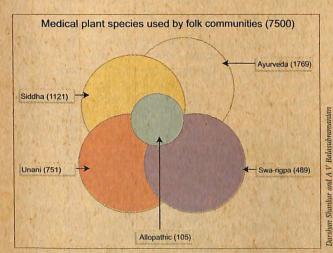
There is a verse in the Ayurveda classic *Charaka*Samhita that explains how local communities understood and explored nature's gift of medicinal plants: "Yasmin





deshe tu yo jaatah tasmin tajjoshadham hitam". "Nature is so (benevolently) organised that it has provided every micro-environment, the natural resources (in the form of plants, animals and minerals) necessary for the typical health needs of the people living in that environment."

Another tale from ancient texts is even more powerful. Punarvasu Atreya, the distinguished Ayurvedic Aachaarya had six disciples, namely, Agnivesha, Bhela, Jatukarna, Parasara, Haritha and Ksarapani. It is said that on one occasion, the Aachaarya assembled all his



Note: The outer box represents the total folk (e.g. tribal) usage, which is not necessarily codified into formal systems; the inner circles are of the formal systems.

disciples and bid them to set forth in various different directions. Their task was to return with all the plants they encountered, that had no medicinal use. While five disciples came back with several plants, Agnivesha returned empty handed. He said that every single plant that he examined had some medicinal use. Agnivesha was thus considered the foremost disciple of Atreya. While each of the six disciples prepared a compendium of Ayurveda, Agnivesha's work is the most outstanding. It has been redacted by Charaka and then by Drdhabala, and is known today as the *Charaka Samhita*.

At the folk level, in every ecosystem from the trans-Himalayas to the coast, local communities have keenly studied the medicinal plants found in their locality. Every 100 km or so, throughout the country, one can observe variation in ethnic names and use of local species, indicating the intimate and independent appraisal that local communities have made of their local resources. Striking illustrations of ecosystem knowledge include the Thakur tribals of coastal Maharashtra, who use over 500 species of plants, including 168 trees, 207 shrubs and herbs, 105 climbers and creepers, 13 grasses and 16 lower plants. Even in this day of increasing spread of allopathic medicines, there are hundreds of millions of people in India who are dependent on biodiversity for their health needs (see Table). Indeed, the World Health Organisation estimates that four-fifths of the world's population uses nature for a substantial part of its medicinal and health requirements.

Folk medicine: a continuing tradition			
Traditional Carrier	Subject/Usage	Number of users*	
Housewives and elders	Home remedies Food and nutrition	Millions	
Traditional birth attendants	Normal deliveries	7 lakhs	
Herbal healers	Common ailments	3 lakhs	
Bone-setters	Orthopaedics	60,000	
Visha Vaidyas (Snake, scorpion, dog)	Natural poisons	60,000	
Specialists	Eyes, Skin,	1000 in each area	
	Respiratory, Dental,		
	Arthritis, Liver,		
	Mental Diseases,		
	GIT, Wounds,		
	Fistula,, Piles		



Sarpagandha (Rauwolfia serpentina), known in India for its medicinal properties for thousands of years.

The distinctive health traditions of diverse communities in India, are partly based on the distinct ecological niches that different medicinal plants occupy. So for instance, plants like Aconitum violaceum and Rheum spiciforme, are found in the trans-Himalayan areas; Acacia senegal and Capparis decidua in the desert regions of Rajasthan; water plants like Ipomoea aquatica in the Konkan areas of Maharashtra; Cassia fistula and Anogeissus latifolia in the deciduous forests of the Deccan; Capparis aphylla and Balanites roxburgii in the scrub jungles of Karnataka; Myristica malabarica and Vateria indica in the swamps of the western coast; Pandanus tectorius and Thespesia populnea in the coasts of Kerala; and so on.

Nature has also situated bioresources almost as if knowing what humans needed. To illustrate, Neem (Azadarichta indica), occuring in dry, arid and hot habitats, has cooling properties, ideally suited to correct the health imbalances that could occur in such environments. The plant Epedera vulgaris, occurring only in high altitudes, has a broncho-dilatory property, very useful in rarified atmospheres.

Traditional communities have used biodiversity not only to deal with the health needs of humans, but also those of livestock and for needs of crop plants in agriculture. And if one were to take a less human-centred attitude, one would realise that the diversity of life itself is a major component of the health

of natural ecosystems, and in turn healthy ecosystems provide the conditions for plant and animal species to flourish.

Though not very systematically documented, there is a clear relationship between biologically diverse agriculture, and human/livestock health. The most obvious link is nutrition; ask elders in any village, and they will tell you how their traditional diversity of food was so much more nutritious than what is available from the markets now. Across large parts of India (though there were also traditional pockets of malnutrition and under-nutrition), traditional agriculture provided a range of crops, livestock-related products, semi-wild species (such as shrimps and frogs in paddy fields), and other inputs (see article on Agricultural Biodiversity, in this issue). Various nutritional inputs needed by the human body, were provided by such a diversity of produce. With the change in agricultural systems to monocultural plantations, this diversity and the related nutrition are lost, and the replacements from the market do not necessarily make up for this. On top of this loss, the use of chemicals creates other health problems!

Biodiversity loss, health and culture

When biodiversity is destroyed or eroded, as is happening with alarming rapidity across the world, the health of ecosystems as a whole and of their individual members is affected. Health and biodiversity links are a sub-set of the larger relationship between biodiversity and cultural diversity, so the loss of cultural diversity in the face of the increasing spread of "modern' monocultural systems, also leads to a direct loss of people's knowledge that relates biodiversity with health. The spread of the lure of allopathic medicine is so strong, that even in remote areas, villagers are beginning to prefer the pill and the injection over plant-based medicine. A cheap and locally available input is being replaced by an expensive, externally controlled one. This is not to say that all health problems can be tackled by local traditional health systems, or that biodiversity has the answer for all diseases, but simply that haphazard replacement of such

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folio 3 2

may 2001

systems by allopathic ones creates serious imbalances and loss of control.

Unfortunately, whereas there are many studies on the specific bioresources used by ecosystem people for health needs, there are hardly any studies that have shown the epidemological effects on humans and other species, due to loss or disturbance of natural habitats. The economic value of such functions, and of medicinal plants, to human health and welfare, have also not been estimated. Take the example of just one use of one plant, the neem. Half a billion people still use neem branchlets as a toothbrush. To replace this with a commercially available toothbrush and toothpaste, they would have to spend about Re.1 each, per day per person. This means that the value of neem datums



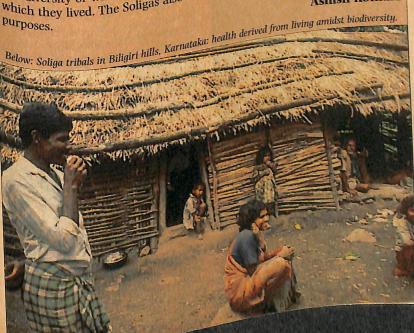
Medicinal plant conservation area in Amba valley, Maharashtra, involving scientists, vaids and forest officials.

Biodiversity, nutrition and health

he link between biodiversity-based nutrition and health is dramatically illering the grant to the mid 1990s, the grant cally illustrated in two examples. In the mid 1990s, the area Melabet Melghat region in eastern Maharashtra was rocked by a few hundred death dred deaths of tribal children, caused by malnutrition during dred deaths of tribal children, caused by maintaining during the drought seasons. It was soon found that children inside the forests of the Melghat Tigor B. Melghat Tiger Reserve had a much smaller incidence of this than those outside, and the control of the standard that children inside the forests of the Melghat Tiger Reserve had a much smaller incidence of this than those outside, and the control of the standard that the standard th side, and that this was because they still had access to a diversity of forest foods (tubers of the still had failed).

foods (tubers, fruits, etc.) even when agriculture had failed.

In the last In the lush Biligiri Hills of Karnataka, doctors have found that Soliga ibals inside the tribals inside the Biligiri Ranganaswamy Temple Sanctuary have a much better health. better health profile than their counterparts in the adjacent villages and towns. down. towns, despite having much less access to "modern" health facilities. For instance, the instance, there was no instance of appendicitis, colonic cancers, sexually transmitted. transmitted diseases, vitamin deficiencies, hypertension, certain heart diseases, and attended illnesses. The reason, again, was accompanied to the control of the control diseases, and other stress-induced illnesses. The reason, again, was access to a diversity of the reason and the natural surrounds in to a diversity of wild and semi-wild foods, and the natural surrounds in which they live a surround to the stress of the semi-wild foods. which they lived. The Soligas also use over 300 herbs for medicinal purposes Ashish Kothari



alone is a billion rupees per day. Add to this the hundreds of other uses of neem, and its value would be magnitudes more than the medicinal

exports of India.

It is to be hoped that the newfound enthusiasm of the Indian government, illustrated in the setting up of a National Medicinal Plants Board, would encompass such studies and related action, though this is not yet clear from the mandate of the Board.

It is in this context, that the ongoing National Biodiversity Strategy and Action Plan (NBSAP) process (see Introductory essay) is attempting to bring back focus on the above issues. A specialist Thematic Working Group is drafting a national level action plan on Biodiversity and Health. At many of the State and substate levels at which the NBSAP process is being carried out, medicinal plants and health traditions, are a key focus. At Vidarbha, Maharashtra, for instance, a people's health organisation is doing a series of consultations with villagers, government officials and NGOs, to prepare a plan to conserve the biodiversity of the region and thereby secure the livelihoods, health, and security of lakhs of villagers.

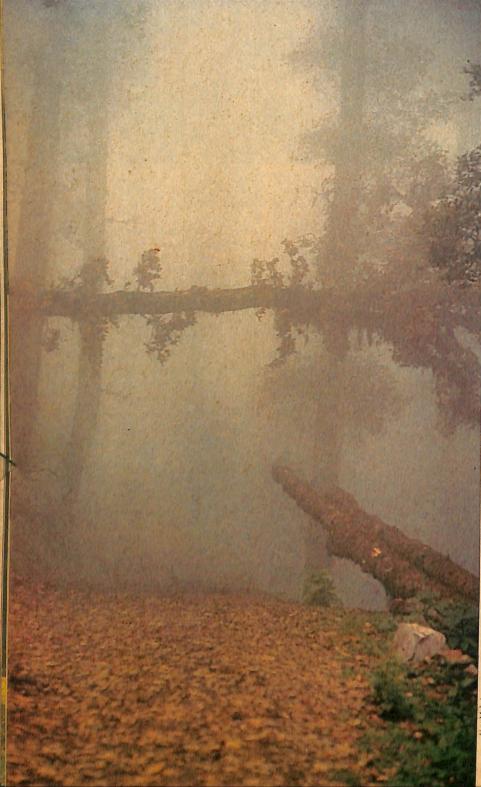
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Develop and perish?

Ashish Kothari



umanity entered the 21st Century with two strongly contrasting views on the future. One pointed to a new millennium filled with the hope of information technology, genetic engineering and revolutions in health and medicine; the other showcased the irretrievable destruction of our life support systems through toxic wastes, global warming, land degradation, climatic change, and the loss of biodiversity. The former suggested that humanity was the best thing that could have happened to the earth, the latter said it was the worst.

Which viewpoint one tends towards is likely to be partly dependent on one's place in society. Are you one of India's lucky ("hardworking") citizens, who subscribes to an English newspaper, avoids the vagaries of Mumbai's or Kolkata's or Delhi's or Chennai's weather by travelling to an air-conditioned office in an air-conditioned car and curses the slums that line the road you travel on? Or are you one of the villagers whose fellow tribals were shot dead by the police, because you happened to be protesting against the takeover of your ancestral lands and forests by a foreign mining company in Orissa? Or, for that matter, while resisting displacement by a dam in Jharkhand, dispossession by a commercial trawler in the waters off Kerala's coast, or loss of your forest and agricultural lands by a tourist resort in Maharashtra?

That's a silly question, you'd say, for such a villager would surely not be reading Folio. Very right. Even less likely to be reading this article are any of the species of plants and animals which, solely due to human destructiveness, are today facing the final prospect of extinction. Not one or two, but thousands of them, as humanity's bulldozing effect on natural ecosystems undermines their very basis of existence.

But then the victims of what we educated people call "development" do not need to read this article, as much as we ourselves do. For it is our middle and upper classes that benefit from this development and clamour for more and more of it. More big dams, more power stations, more superstores crammed with more consumer goods, more

Ajay Mahajan



Left: Mining in Goa, mass-scale destruction of biodiversity and the environment.

Below: A classic example of the conventional view of development: destroy nature for human prosperity.

expressways that can take us to our destinations faster, more of everything . . . except, perhaps, wisdom?

The cost of development

Worldwide, the commercialisation of agriculture, the growth of the industrial economy, and the more recent push towards globalisation, have all taken a heavy toll of biodiversity and the livelihoods of those directly dependent on natural resources. Conservative estimates put the global loss of forest, fisheries and agricultural productivity, caused by over-exploitation, pollution, and other factors, at tens of billions of dollars. This does not even take into account the loss of critical ecosystem values (especially hydrological) and the social, cultural, and non-quantifiable economic losses, which could be even greater than the financially quantified ones. For India, only piecemeal estimates are available: for instance, the Tata Energy Research Institute estimates that forest degradation causes the loss of about Rs. 57 billion worth of loss in wood produce alone. If one were to add to this, the loss of non-timber forest produce (absolutely critical for the survival of tribal and other rural communities), the damage would be astoundingly high. Possibly even greater is the loss relating to the destruction of natural habitats which results in an increasing cycle of droughts and floods and more erratic rainfall. Forestry, fisheries, and agriculture account for over 30 per cent of India's GDP, yet the biological diversity that forms their base gets virtually no place in the

budgets and plans for these sectors.

If you thought that as an urbanite, you are immune to this, think again. Were it not for the reservoirs that protect reservoirs providing Mumbai with at least 30 per cent of its drinking water, its citizens or municipality would have to pay through their noses to bring water from longer distances. Cut down the forests of the Shimla water catchment sanctuary, and that city will die for lack of water. Where mangrove forests along Orissa's coasts had been destroyed for "development", the cyclone that hit this state in 1999 caused hundreds of crores worth of damage; where these forests were still intact and acted as a buffer, the damage was contained.

The impact of the neglect of biodiversity in development planning can be seen in several sectors: All over the world, nature's mightly barriers, separate oil gas, minerals and water from their destruction. Only a handful of international giants can being frequency of their is in ladar barriers, and the properties.

In the learness of the grant of t

Agriculture: The Green Revolution's stress on promoting monocultures of "high-yielding varieties", has yielded significant production increases. However, the cost has been greater, and we are now paying for it. Foremost is the rapid erosion of crop and livestock (including poultry) diversity, especially from farmers' fields and the pastoralists' pastures. This loss of diversity has undermined the stability of farming systems, led to loss in soil fertility, made farmers more dependent on markets and outside agencies, reduced nutrition once obtained from "wild" foods on farms (e.g. fish and prawns in traditional rice fields), increased the need for expensive and poisonous chemical fertilizer and pesticides, and eroded the genetic diversity on

which continuous crop and livestock development is based. The impact is greatest on tens of millions of small farmers and pastoralists. The current draft agricultural policy fails to integrate these issues, focussing as it does on high-yielding hybrids and varieties, large-scale agroprocessing, and other such strategies that have already eroded biodiversity and sustainability.

Water resources development:

Development of water resources for irrigation, drinking water and other purposes, has been fixated on megaprojects. Big dams and irrigation projects have submerged several hundred thousand hectares of forests, displaced millions of people who have in turn put further pressure on natural resources, and led to damages in downstream aquatic and marine habitats. The

proposed National Water Policy makes some of the right noises regarding sustainability, but does not centrally integrate biodiversity and livelihood concerns. The relationship between watersheds and biologically diverse catchments, for instance, remains neglected.

Tourism: One of our most rapidly growing industries, tourism, has led to deforestation, enormous waste generation, and cultural pollution. Even "ecotourism", the latest buzzword, is more a greenwash than anything else. The 9th Plan does not deal with ecological aspects of tourism in a major way. Critical gaps remain in devising truly ecologically friendly modes of tourism, and in promoting the livelihoods of local communities based on more sensitive tourism.

Energy and infrastructure: These are perhaps the sectors in which integration of biodiversity concerns is the weakest. Environment impact assessment procedures remain weak and ineffective (see box). In the last decade or so, the greatly accelerated thrust towards increasing road, rail, and other infrastructure, to meet the demands of the liberalised economy, has also resulted in a renewed attack on biodiversity-rich areas and on the natural resource base of millions of people.

Such attacks on India's natural resources are not a matter only for the board-room discussions of wealthy upper class "environmentalists". Witness, for instance, the repeated agitations by millions of fisherfolk along India's coast. Their main demands: ban commercial trawling in Indian seas,

stop all commercial shrimp/prawn

The EIA farce



key tool meant to ensure that economic development does not undermine the ecological basis on which all life depends, is Environmental Impact Assessment (EIA). Unfortunately, a series of recent events has shown what a farce this system has been reduced to, and made people realise what needs to be done to rescue and use its full potential.

In 1994, the Environment Impact Assessment (EIA) Notification (under the Environment Protection Act. 1986), made it legally mandatory for 29 industrial and developmental activities to get environmental clearance from the centre. Each of these activities needs to follow a specified procedure, for instance, the preparation of a detailed EIA report and its evaluation by an Impact Assessment Agency. In 1997, the notification was amended to include. as mandatory, a public hearing to be conducted before a project is considered for clearance.

EIAs and public hearings are, on

paper, progressive tools in the direction of sustainable development planning. EIAs are supposed to give a full understanding of the impact of a proposed project on nature and people, and help assess whether the project should or should not be built. They also form the base of mitigatory plans if the project is approved. A Public hearing is the only forum that local residents and concerned groups have, to come face to face with project proponents and government authorities and to voice their suggestions and objections.

However, the implementation of both is ridden with concerns. One of these is the preparation of fraudulent and fabricated EIAs. disturbingly commonplace. The international consultant Ernst and Young recently made headlines, when NGOs exposed one of its EIAs, for a dam in Karnataka as being a total lift-off from a previous EIA done on a different dam. Unfortunately, the public condemnation that Ernst and Young got for this, did not deter Tata Energy Research Institute (TERI), which was later contracted to do the EIA for the same project, from producing a shoddy and incomplete report.

There are several reasons for such a situation. Many of the guidelines for EIAs are outdated and incomplete. Expertise to carry out professional EIAs is inadequate, or not easily available. Most serious,

however, is the fact that EIAs are usually funded by those who are proposing the project, thereby making independent studies very difficult. The severe lack of public involvement, and non-availability of the full EIA document to the public. are other critical problems. While NGOs and local residents have used public hearings as a forum to raise the lacunae and loopholes in the existing EIAs, the government is under no obligation to incorporate the objections raised in such a hearing. Sometimes, despite serious objections by residents and NGOs along with evidence of negative impacts, projects have been granted clearance, like in the case of a barge mounted power plant in Dakshin Kannada district of Karnataka.

The EIA notification could be one of the most effective means of conserving biodiversity by checking destructive industrial development. However, the above problems need to be tackled to make it so. Most important, EIAs need to be commissioned with funding independent of the project proponents, and be carried out by agencies with a clear track record of integrity. Public involvement needs to be built in centrally, at all stages of the process. Without such changes. these essential tools will remain largely paper tigers.

Kanchi Kohli and Ashish Kothari

farming, implement the Coastal Regulation Zone stipulations restricting destructive activities upto a certain distance inland from the sea, and promote traditional sustainable modes of fishing. The connection between biodiversity in the seas and their own livelihoods, was very clear to these fisherfolk, but had been ignored by those in government who plan fisheries development.

Do we have an alternative?

Are environmentalists only the "no-no" brand of romantics and misguided anti-nationals that the proponents of today's development model label them to be? Not quite. Even while protesting against this model, many environmentalists, community activists and sensitive academics, scientists and government officials, are pointing to concrete alternatives, which enhance human welfare in tune with the dynamics of nature. Some examples:

In agriculture, hundreds of farmers and groups are successfully enhancing biodiversity while also increasing productivity and employment potential through organic farming systems. In Zaheerabad area of Andhra Pradesh, Dalit women have demonstrated that biologically diverse farming, linked to a people-centred public distribution system, can considerably enhance livelihoods, employment and the nutritional status of the poorest people (see article on Agriculture, in this issue).

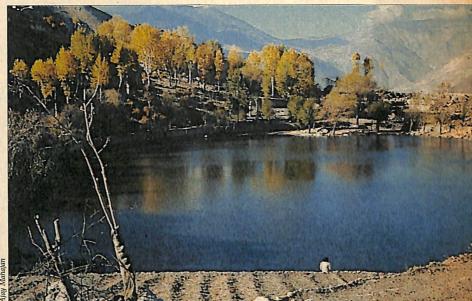
• In water development, experiments in diverse agro-climatic conditions show that decentralised water harvesting with catchment protection can provide enough for drinking and agriculture, while actually regenerating and maintaining biological diversity. In Alwar district of Rajasthan, for instance, several hundred villages have boosted agricultural production and eradicated drought, through a network of small checkdams (johads), regenerated catchment forests, and helped revive disappearing wildlife populations.

• In tourism, residents of the Rathong Chu and Khangchendzonga region of Sikkim have moved towards an ecologically sensitive model of visitation that provides sustained benefits to local people



Left: Gond adivasi in Mendha (Lekha), Maharashtra, successfully establishing community-controlled natural resource management and livelihood generation in tune with nature.

Below: Hill top lake in Nako, one of the highest round-the-year habitated villages of the world. In the harsh, almost rainless, high altitude desert of Kinnaur, local communities have channelled the snow melt from the high peaks, over kilometres. With this sole source of water they've grown an oasis of some of India's most amazing almonds, apples, apricots and diverse crops.



and fisherfolk at sites in Goa have protected turtle nesting sites as these attract the discerning tourist.

• In industry, several experiments with small-scale units using natural dyes, medicinal plants, non-timber forest produce and other biological resources, are demonstrating that sustainable use is possible and desirable. In the Biligiri Hills of Karnataka, for instance, the Vivekananda Girijan Kalyana Kendra has worked with Soliga tribal cooperatives to manage sustainable harvests of medicinal plants, and process them into saleable products.

There are, however, some sectors of our "globalising" economy that remain largely immune to the demands of sustainability. In energy development, for instance, scientists like A.K.N. Reddy and groups like PRAYAS have suggested alternatives focusing on efficiency in production and distribution, and non-conventional sources, but these remain neglected by the decision-makers. Infrastructure development, in particular ports, expressways and so on, have a long way to go to build in environmental concerns.

For the first time, a comprehensive attempt to build an alternative development vision based on biodiversity concerns, is taking place under the ongoing National Biodiversity Strategy and Action Plan. Voices from the grassroots, from practitioners of alternative development strategies, from those who understand the workings of the system and how to change it, will all get built upon in the preparation of this plan. A working group may be set up to integrate biodiversity across all the sectors of the upcoming 10th Plan. If this happens, it could send a clear signal to all central ministries and State governments, that it is time they took biodiversity and nature seriously. The NBSAP could be one small step in the right direction. Ultimately, however, it is only strong citizens' pressure, of the kind mounted by millions of fisherfolk in relation to the fisheries policy, that will alter the course of destructive development our country has taken.

Biopiracy and traditional knowledge

R. V. Anuradha

The writer is a lawyer and legal consultant, and active with the environmental action group Kalpavriksh.



n 1995, two U.S. based Indians were granted U.S. Patent 5,401,504 on Use of Turmeric in Wound Healing, (popularly known as the Turmeric patent), which was assigned to the University of Mississippi Medical Centre, U.S. The invention claimed under the patent was the use of turmeric at the site of an injury and/or its oral intake to promote the healing of

The news was greeted with disbelief and surprise by most people in India. Turmeric has been traditionally used in India for its many special properties in woundhealing. For instance, it is used as a blood purifier, in treating the common cold, and as an antiparasitic for many skin infections. It is also used as an essential ingredient in cooking many Indian dishes. How could someone obtain a patent - i.e., an exclusive right to sell Left: Hill turmeric.

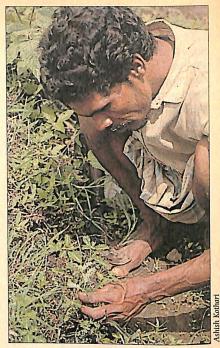
and distribute something that was so commonly known - was the disturbing question.

The media coverage of the patent generated debate and discussion on the issue and the Centre for Scientific and Industrial Research (CSIR), an autonomous institution under the Department of Science and Technology, Government of India, decided to file for reexamination of the patent at the United States Patent and Trademark Office (USPTO).

The challenges before them were many, since the patent had to be challenged in accordance with the specific requirements under U.S. law. The claimed subject matter was the use of "turmeric powder and its administration", both oral as well as topical, for wound healing. As per the requirements of U.S. law, it was necessary to find adequate evidence in the form of printed and published information that would establish that the manner of use of turmeric as in the claimed invention, was known before the patent was claimed and, therefore, the patent was invalid. Despite the fact that the use of turmeric was known to every Indian household for ages, finding published information on the use of turmeric powder through oral as well as topical route for wound

Fortunately, after an extensive search, 32 references were located, some of which were more than 100 years old, and in the languages of Sanskrit, Urdu and Hindi. The USPTO revoked the patent, stating that the claims made in the patent were obvious and anticipated, and agreeing that the use of turmeric was an old art of healing wounds.

healing was a difficult task.



Right: Adivasi with Phyllanthus, traditionally used for jaundice: there is a need for alternative protection regimes for such

IPRs over products of biodiversity

The patent on the "use of turmeric in wound healing" is but one of the many examples of how patents are being sought over various aspects of biological resources and products derived from the same.

What complicates matters in such patents is that the various useful properties and knowledge regarding biological resources have been identified and preserved through consistent skill, observation and usage by various local and indigenous communities through the world. In the field of pharmaceutical research, indigenous knowledge contributes towards the identification of the material in developing the drug, and often provides information of its precise uses in treating particular illnesses, its means of preparation and its dosage. Modern science and patent law, however, do not recognise this as valuable "innovation". Access to such resources and information is, therefore, assumed to be "free"

Some of the other recent examples of patents granted over "inventions" based on biological resources pertain

i) Composition of jamun, bittergourd, gur-mar and eggplant for treatment in diabetes.

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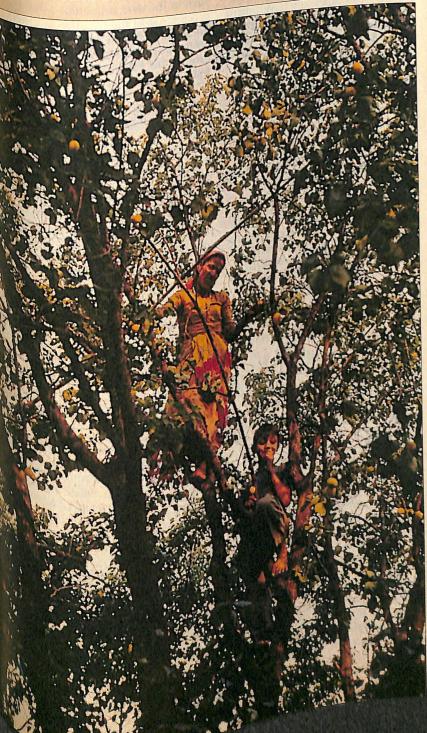
The piracy of human genetic material

Most alarming is the increasing trend to claim patents even on human genetic material. This came to the public eye when, in the mid-1990s, a patent claim on a cell line of a Panama indigenous woman,

by American scientists, was internationally exposed. The sheer embarassment of this exposure caused the patent claim to be withdrawn, but there are perhaps dozens of other such claims pending in various patent offices around the world . . . without the knowledge, much less the consent of the the consent, of the person whose blood, tissue, or hair sample by the person whose blood, tissue, or hair the person. sample has been taken and used in the patent. Also of

dubious validity is the claim that the properties of human genetic material are "inventions" that can be patented; they are more in the nature of "discoveries" of properties already existing in nature. Suspicions have been raised about whether the global human genome project, in which body samples are being collected from hundreds of communities across the world, is also lending itself to such misappropriation. Particularly targeted are the so-called "vanishing" tribes, as researchers hope to find unique characteristics that may have valuable leads to medical and scientific discoveries.

Ashish Kothari



Left: The hardy, indigenous Himalayan Wild Apricot . . . one of the nature's spectacular gifts to the Himalayas, unlike the nonindigenous apple, which survives on a cocktail of chemicals.

The delicious, tangy fruit yields jam, chutney and juice. The fruit kernels yield the celebrated Apricot Oil (edible, variously cosmetic and medicinal) and the Apricot Scrub. While urban India and much of the world use apricot scrub and oil from the West, Himalayan communities have been using them for centuries. It's a similar story with many other plant products, e.g. Aloe Vera, or ghitrakamari, as it is known here, used in shampoos, conditioners, sunscreens and lotions. This commonly found plant has been used for centuries to moisturise skin, on the scalp and is even eaten as a vegetable in many parts of India.

- ii) Various products obtained from the neem tree.
- iii) Varieties of basmati which have the characteristics of growing in temperate climate in the absence of
- iv) Composition of methi as a tonic to bring down blood glucose levels.
- v) Compositions comprising of kala jeera or kalonji for increasing immune functions, and in the treatment of diabetes, hepatitis, and asthma.

The basic logic behind patents is that it is a mechanism to promote innovation, by ensuring that the "inventor" would have the exclusive right to sell and distribute the "product" s/he has "invented". While there are arguments both for and against the value of patents in general in promoting innovation, patents over products of biological diversity could pose certain specific problems, not the least of which is: how does one assess the degree to which human innovation has resulted in the final product?

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Villagers who have prepared Community Biodiversity Registers in Andhra Pradesh; safeguarding and re-affirming pride in traditional knowledge.



Biodiversity registers

GOs and institutions in India are attempting to document the knowledge, skills and techniques of local communities related to biological resources through the Community (or People's) Biodiversity Register, in the belief that such documentation would be a deterrent to biopiracy; as well as for instilling a greater sense of pride among local communities over the knowledge they possess.

The Register processes documents of community and individual knowledge of occurrence, practices of propagation, sustainable harvests and conservation, as well as economic uses of biodiversity resources. All information accumulated in the Register can be used or distributed only with the knowledge and consent of the local community, so that it is in a position to refuse access to the register and to set conditions under which access would be allowed. The community, while consenting, can charge fees for access to the Register and collection of biological resources. Decisions on how to disburse the funds are to be made through village community meetings.

The fear about biodiversity registers is they may place knowledge hitherto regarded as "secret" by communities, in the public domain, and that once this is done, it would be an open invitation for corporate and research interests to freely use it. On the positive side, these registers are expected to function as tools to establish claims of individuals and communities over knowledge and uses of biodiversity resources, and to bring to them an equitable share of benefits flowing from the use of such knowledge and resources. This, however, can be achieved only when legal mechanisms of control over the register are put in place, which is not vet the case.

R.V. Anuradha

Patents, by definition, cannot be granted over something that is obvious: that is known or anticipated by prior use; that is a product of nature, and not a product of human creativity. However, laws of different countries vary in the criteria used for assessment of the degree of human innovation that is required for qualifying for a patent. In the turmeric case, it was possible for the CSIR to establish that the patent claim was not "new". However, it may not be possible to establish this in each of the examples mentioned. In the basmati patent, for instance, the Government of India has challenged only three of the 20 claims granted to the patent holder. Ricetec: the belief being that there was enough evidence on record only to challenge these. What was being challenged were only claims regarding certain characteristics of basmati (specifically starch index, aroma, and grain dimensions); and not the other claims of the patent pertaining to the novelty of the rice lines and plants cultivated from these.

Patents over herbal mixtures and compositions (such as the examples above), however, present greater scope for argument for revocation, since the properties of each of the ingredients in the composition, and sometimes the composition itself, is not "novel".

Another issue for consideration is that while in the case of turmeric, the use was commonly held knowledge, there would be many instances when use/s of a specific plant or herb is known only to a particular community or tribe or individual. "Patenting" products developed from such biological material poses further challenges.

Though in effect, the turmeric case was a "success story", it also revealed a variety of "problem areas" in challenging what was obvious to people in India, based on the laws of a foreign jurisdiction. The lessons learnt and problem areas can be summarised thus:

☐ There is a wide gap in the availability of information in countries like the United States for patent examination purposes pertaining to traditional knowledge base from biodiversity-rich countries. The insistence on written published information, as opposed to oral knowledge, could make challenges to

such patents difficult. The need for greater scrutiny of patent applications pertaining to biological resources, and the need to consult the source of the biological resource and knowledge pertaining to the same is, therefore, imperative. Efforts towards documenting peoples' knowledge in Biodiversity Registers, if structured carefully, could help to establish "prior use" of a particular resource/ product derived from it. (See Box on Biodiversity Registers).

□ Although remedy is available in the laws of developed countries, such as the re-examination proceedings in the U.S., the financial, technical and legal costs for initiating such proceedings are exorbitantly high. As pointed out by India in one of its papers to the WTO, it would be more cost-effective to establish an internationally accepted solution to prevent biopiracy than to divert national resources to expensive judicial processes for the revocation of patents.

Currently, there is no requirement under patent laws of most countries for the holder of the patent, or any intellectual property rights for that matter, to share the benefits with those who had collected, preserved or initially identified the biological material as potentially worthy of investigation. The TRIPS Agreement that seeks to harmonise the Intellectual Property laws of various countries does not mandate this either.

India and other developing countries have emphasised in various communications to the World Trade Organisation (WTO) that the rights of holders of traditional knowledge to share benefits arising out of innovation on the basis of their knowledge and the biological resources nurtured by them, should be recognised. They have also have recommended that applications for patents should mandatorily disclose the source of origin of the biological resource and knowledge pertaining to it, so as to facilitate benefit sharing with the originators of the knowledge and resource. The United States has strongly opposed this as a "legal and administrative nightmare". This kind of a stand by the U.S. would only lead to greater misappropriation of biological resources and knowledge pertaining to the same.

Biological Diversity Legislation

At the Earth Summit held in 1992, the Convention on Biological Diversity (CBD) was concluded, to which India is a party. The basic objectives of the CBD are: conservation, sustainable use of biological diversity and equitable sharing of benefits arising from the use of biodiversity. It further mandates the signatories to it to respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities and encourage the equitable sharing of benefits arising from the utilisation of such knowledge, innovations and practices. As a legally binding treaty, the CBD can be expected to have some influence on these issues.

To ensure that there are legal mechanisms in place to ensure that this knowledge is not freely appropriated, the Indian government is in the process of finalising a law titled the Biological Diversity Bill. The bill contains various provisions for regulating access to biological resources, patent claims, and indigenous knowledge protection (see Box in article on Legal Spaces). This bill is a beginning, though inadequate.

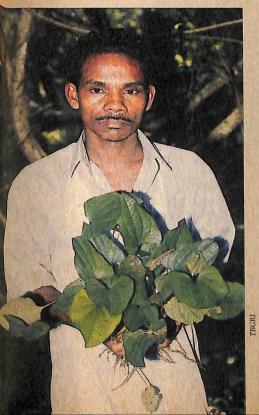
Of simultaneous and critical importance are legal mechanisms to ensure right to control for indigenous and other local communities over the biological resources and related knowledge, of which they have been the custodians.

Below: Jarawas in Andaman Islands, one of India's smallest tribes, now threatened by "contact" parties: will their resource and knowledge rights be protected?



Towards benefit sharing: the Kani-TBGRI arrangement

he Kani tribals in
Thiruvannathapuram district, Kerala, claim that one can live for days together without food, and still be able to perform rigorous physical work, by eating a few fruits of a plant called Aarogyapaccha everyday. The term means the greener of health, the one that gives very good health and vitality. Scientists from the Tropical



Botanic Garden Research Institute (TBGRI), learnt about the use of the plant from the Kanis and conducted detailed investigations on the same. Study of the leaves of the plant revealed it had anti-stress, antihepatotoxic and immunodulatory/ immunorestorative properties. Eventually, the drug Jeevani was formulated by TBGRI with Aarogyapaccha and three other medicinal plants as ingredients. Thereafter, a license to manufacture Jeevani was given to Arya Vaidya Pharmacy, Coimbatore (AVP) in 1995, for a period of seven years, for a fee of Rs. 10 lakhs. TBGRI decided that the Kani tribals would receive fifty per cent of the licence fee, as well as 50 per cent of the royalty obtained by TBGRI on sale of the drug.

In November 1997, some of the Kanis, with assistance from TBGRI, registered a trust called Kerala Kani Samudaya Kshema Trust with the objectives of: welfare and development activities for Kanis in Kerala, preparation of a biodiversity register to document the knowledge base of the Kanis, and evolving and supporting methods to promote sustainable use and conservation of biological resources. Although all the Kanis of Thiruvananthapuram district are yet to become members

Left: Mallan Kani, one of the informants of Aarogyapaecha's properties.

of the Trust, efforts are on to achieve the same. Fifty per cent of the licence fee received by TBGRI has been transferred to the Trust. However, manufacture of Jeevani, and therefore flow of royalties, has run into problems for a number of reasons.

The Kanis mostly live in and around the Reserved Forest areas of Thiruvananthapuram district. They would, therefore, require the permission of the Forest Department (FD) for harvesting the plant, which has not been forthcoming because of fears that commercial harvesting would threaten conservation of the plant. This has also been compounded by incidents of pilferage of the plant by non-tribals. There is also no uniform view among the Kanis, some of whom have objected to the manner in which the "arrangement" with TBGRI evolved. Activists have also raised issues of whether indigenous knowledge is being adequately protected and rewarded in this arrangement.

TBGRI and AVP, however, believe that there are means to sustainably harvest the plant in the forest area, that are not being sufficiently explored. This and other issues of benefit-sharing and equity will need to be resolved, if this novel initiative is to become a model for the country.

R. V. Anuradha

Legal spaces for conservation



V. Shruti Devi and Kanchi Kohli

V. Shruti Devi is a legal consultant and Kanchi Kohli is with Kalpavriksh, Delhi. Both are on the Technical and Policy Core Group of the National Biodiversity Strategy and Action Plan. he last two decades of the 20th century witnessed the increasing use of legal and judicial processes by Indians to protect the environment. This was manifested by an intensified pressure to strengthen relevant laws and policies, a flood of public interest litigation, and enhanced attempts to impart legal literacy among officials, activists and local communities. The courts responded with a range of pro-environment judgments. However, their impacts have not always been as intended.

A clear message from the legal activism of these decades was that there was plenty of space available through which citizens could seek legal recourse. While they are by no means adequate, even these existing avenues remain inadequately tapped.

What spaces exist?

The conservation of biodiversity has been woven into the Constitution through Article 48-A.

one of the Directive Principles of State Policy: "The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of our country." One of the Fundamental Duties of the citizens under Article 51-A is to protect and improve the natural environment including forests, lakes, rivers and wildlife, and to have compassion for living creatures." Although these provisions are not directly justiciable (cannot be taken to court), they can both be effective tools to guide the spirit with which statutes, policies and legal actions come into being.

Over the past two decades, issues relating to ecology and the quality of habitat have been repeatedly addressed on the platform of public interest litigation (PILs). PILs, filed under Article 32 in the Supreme Court, and Article 226 in the High Courts, have been used as an effective tool by many concerned citizens to challenge non-compliance of legal norms, violation of

notifications and so on. These Articles give the right to a citizen to approach the judiciary and demand action, without necessarily having to cite violation of a specific law at an initial stage.

One of the most effective arguments has been to interpret the Fundamental Right to Life under Article 21 of the Constitution, to include the right to a clean and healthy environment. Litigation seeking such an interpretation has often resulted in the judiciary attempting, through its judgments, to rescue specific sites from the destructive influences of pollution, deforestation and so on.

However, one must note that these decisions are often driven by anthropocentric needs more than an ethical concern for plant and animal species as such. In a case filed by the Vellore Citizens' Welfare Forum, the issue raised was the discharge of untreated effluents from tanneries and other industries in Tamil Nadu. It was found that thousands of hectares of agricultural land had been rendered unfit for cultivation. Agricultural diversity and sustainability was pitted against the economic gains argument of the foreign-exchange-earning tannery business. The Supreme Court,

calling for the regulation of these activities, advocated the concept of sustainable development, and indicated that the Precautionary Principle and the Polluter Pays principle are essential ingredients for this.

Judicial interpretations using the Constitution are one avenue. The other is the direct use of environmental Acts, Notifications, Rules and Guidelines. The most intimately connected to biodiversity are the Wild Life (Protection) Act of 1972, the Forest Act of 1927, and the Forest Conservation Act of 1980. Others include the Air and Water pollution control laws. Official agencies have used these laws with good effect, to conserve large stretches of biodiversity-rich areas, though unfortunately neither of these provides for substantial public involvement in their enforcement, and indeed often disempowers local communities.

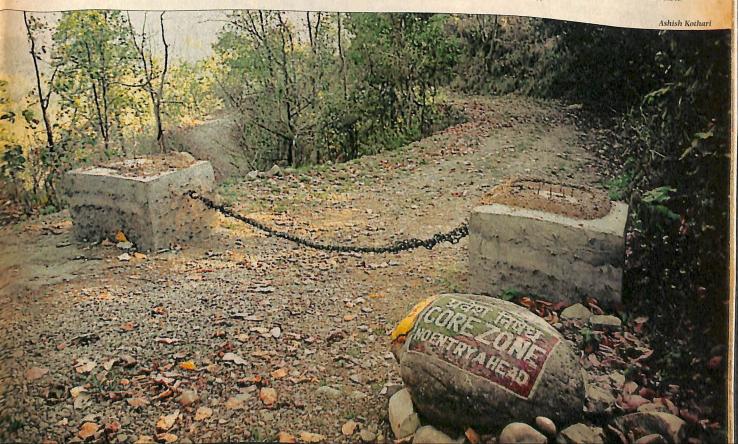
The Environment (Protection) Act of 1986 has been elaborated into several significant notifications and guidelines, including the Environment Clearance notification, the Environment Impact Assessment (EIA) guidelines, and the Coastal Regulation Zone notification. A significant part of this is the clause

on mandatory public hearings, which is the only face to face occasion that the public has, to confront project authorities and government agencies. Though there are serious doubts regarding the efficiency and sincerity with which these statutes are implemented, they are nevertheless potentially powerful tools which are gradually gaining recognition (see Box on EIAs, with article Develop or Perish, in this issue). It was through these provisions that a fraudulent EIA by the consulting agency Ernst and Young, regarding a dam in Karnataka, was exposed by alert NGOs.

Another statute with potential is the National Environment Tribunal Act, 1995, intended to guide the setting up of specialised panels and benches that address cases pertaining to the environment. Given the enormous backlog of cases in our ordinary courts, this is a potentially useful step.

There are also now laws and policies that, somewhat belatedly, provide for people's empowerment in

Below: Legal flexibility is needed to establish zonation and gradation of human activities to ensure optimum conservation and sustainable use land uses.



Right: Village-level agitation coupled with legal activism stopped several hundred mines within the Sariska Tiger Reserve, Rajasthan.

Below: Public meeting prior to moves to resettle village from within Melghat Tiger Reserve, Maharashtra: there is a need for open, transparent legal procedures.



the management of natural resources. One formal manifestation of this was a Central government circular in 1990 to all States, on Joint Forest Management (IFM). This quasi-policy statement directed the involvement of village communities in the regeneration of degraded forest lands. So far. 24 States, by passing JFM resolutions, have reportedly brought over 11 million hectares of land under the scheme. There are conflicting reports on the success or failure of JFM, with serious flaws such as inadequate devolution of power to local communities. Nevertheless, JFM is seen as a progressive step away from the centralised, exclusive Statemanaged regime of the last 100 years.

The most powerful, however, is the Constitution (Seventy-third Amendment) Act, 1992, regarding village panchayats. This law sought to bring the power to manage local resources closer to the people. The Panchayat (Extension to Scheduled Areas) Act, 1996 is even more powerful in this respect, bestowing unprecedented elements of selfgovernment to scheduled adivasi areas. The working of the Panchayat Raj law needs to be examined separately in each of the States. resulting in State-specific recommendations. The new "forest



States" of Chhatisgarh, Jharkhand and Uttaranchal, especially, would need to urgently conduct such an exercise, so that recommendations could be "on board" at an appropriate stage of planning.

A comparative analysis of the decentralisation statutes, with the existing resource conservation statutes, is also necessary, for there are potential contradictions and conflicts: one essentially built on the discourse of human rights, and the other, around the argument of protecting nature in itself. A 1997 order of the Supreme Court directing States to settle the rights of all people living inside and around protected areas, has only served to increase conflicts and given vested interests a convenient entry point to demand the denotification of protected areas. But this is not an inevitable conflict, for there are critical spaces in between, where wildlife conservation and people's livelihood needs go hand in hand. This, indeed, was the motivation behind a strong people's movement in the 1980s which resulted in an alternative People's Forest Bill, and behind attempts to amend the Wild Life and other conservation laws to bring people onto the centre-stage. Finally, a potentially powerful new space is the proposed Biological Diversity Bill, 2000 (see Box).

What is the future of legal spaces?

There are numerous spaces for biodiversity conservation present in India today, and many others in the offing. However, all of them are invariably ridden with problems of content or implementation. It is also disturbing to note the frequent dilution of the spirit and substance of these laws, wilting to national and international commercial interests. Statutes for conservation such as the Forest Conservation Act,

are under severe pressure from State governments intent on quickly using their forest lands for so-called development projects. Unless these counter-trends are understood and arrested, the gains of the 1980s and 1990s could well be lost in a very short period of time.

The ongoing National Biodiversity Strategy and Action Plan (NBSAP) process attempts to understand and highlight legal spaces, point towards the need for new spaces, and reconcile some basic contraditions. It is doing this in different ways. A national working group is putting together the overall picture. It is focussing on the contradictions between conservation and development law, and between conservation and livelihood-related law. Specific critical reviews are being commissioned on topics such as the environmental impact assessment procedures. States are being encouraged to conduct similar exercises and to analyse Statespecific laws and policies. Groups working on individual aspects of biodiversity (wildlife conservation, agricultural diversity, livelihoods, culture, health, and so on) are being guided to assess the legal implications of their analysis and recommendations. And all this is happening in a manner that encourages the mass participation of all those interested.

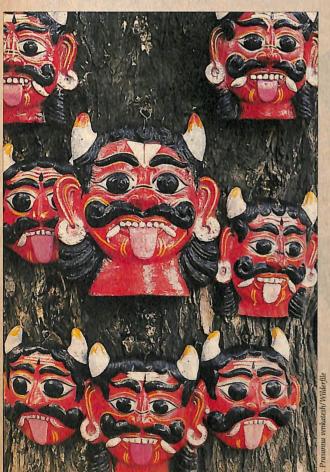
The spaces for conservation that the law provides run the danger of remaining hollow unless people are armed with knowledge, attitude and commitment. In order to translate one of the world's largest chunks of environmental law into the actual conservation of biodiversity, we need to generate nationwide public opinion, powerful enough to target political will.

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Biological Diversity Bill 2000

ealising that there is no comprehensive legislation dealing with biodiversity in India, and following up on its obligations under the U.N. Convention on Biological Diversity, the Government of India has introduced the Biological Diversity Bill 2000 into Parliament. Currently being examined by a committee of MPs, this Bill:

- Prohibits transfer of Indian genetic material outside the country, without approval of the Indian Government;
- Stipulates that patents or other intellectual property rights (IPR) over such material, or over related knowledge, can only be taken after seeking permission in advance;
- Provides for the levying of appropriate fees and royalties on such transfers and IPRs;
- Regulates access to such material by Indian nationals also, to stop over-exploitation;
- Provides for the sharing of benefits of various kinds, including transfer of technology, monetary returns, joint R&D, venture capital funds, and joint IPR ownership;



- Provides measures for habitat and species protection, EIAs of projects which could harm biodiversity, integration of biodiversity into all sectoral plans, programmes, and policies;
- Gives local communities a say in the use of resources and knowledge within their jurisdiction, and to charge fees from parties who want to use these resources and knowledge;
- Provides for the protection of indigenous knowledge, through appropriate legislation or administrative steps such as registration at local, State, and national levels;
- Stipulates that risks associated with the use of genetically modified organisms, will be controlled through appropriate means;
- Provides for the designation of institutions as repositories of biological resources.

The Bill envisages the creation of authorities and funds at National, State, and local levels.

Hidden within the overall progressive thrust of the Bill are some serious defects that will need to be tackled. For instance, it omits from its purview all claims of IPRs that are made under the proposed Protection of Plant Varieties and Farmers' Rights Bill (which is also currently in Parliament). Unfortunately the Plant Varieties Bill does not provide for prior consent from farmers or compulsory benefit-sharing arrangements where farmers' varieties or knowledge is used, so such an exemption provides a major loophole for corporations and scientists to gain monopolistic IPRs on plant varieties.

Secondly, the Act does not provide citizens with the power to approach courts if they detect violations. The final expert committee draft of the Bill presented to the MoEF contained such a *locus standi* to citizens, and it is strange that this has been left out.

The Bill is also soft on Indian entities, requiring only "prior intimation" for their use of bioresources rather than permission as in the case of foreigners. This could be unjustified, given that Indians (especially corporations) are not necessarily any more responsible in their conduct.

The empowerment of local community bodies under the Bill is rather incomplete, for much greater powers to gram sabhas should have been provided.

If the above shortcomings are tackled, however, the Bill could be a powerful tool for conservation and for securing the livelihoods of biodiversity-dependent communities.

Ashish Kothari

Every child comes with the message that God is not yet discouraged of man.



dharshila is a small school for tribal children in western Madhya Pradesh, run by the Veer Khajiya Naik Manay Vikas Pratishthan. In this region, as in most parts of India, cash crops or hybrid seeds promoted by government or commercial agencies are replacing local crop varieties. With help from the Adharshila teachers, students interviewed village elders, and made lists of the crops sown on their farms, marking separately the local seeds and the hybrid seeds. Students also collected about 200 samples of 25 varieties of local seeds from 25 villages. A plot of land at the school was reserved for propagation of these seeds. Local tribals explained to the students that the seeds should be intercropped, as this reduces the risk to farmers.

A drought occurred that year. A survey of the crop failure in the year showed that soybean failed due to lack of water, but jowar, bajra, a local variety of maize and other smaller grains survived. The wiser farmers were the ones who had planted several varieties of crops, including local varieties. At a parents' meeting the Adharshila teachers discussed the importance of agro-biodiversity, and some parents agreed to propagate local seeds. The understanding of crop diversity, and the need to conserve it for livelihoods and other purposes, was

being revived.

In the early 1990s, members of a wildlife conservation organisation, called Nature's Beckon, went to the Chakrashila forest in Assam. They sighted a troop of Golden langurs, which were thought to have disappeared from North East India and were reported only from the hills of Bhutan. One reason attributed to the existence of this population in Assam, was the presence of the tree Terminalia citirina, locally known as hilikha, the fruit of which the langur eat. This meant that the entire habitat would have to be protected to save the langur from extinction.

Nature's Beckon pioneered a campaign to get the reserve forest declared as a sanctuary, after discussing the implications with local villagers. Committees, mainly comprising youth, were formed in all the adjoining villages. Other media were also used to highlight the issue. This helped create a



Above: Forest fires have been one of the biggest threats to Himalayan forests in the last decades, and can be tackled only through large scale community effort and education.

conviction among the villagers that the forest should be protected, and they got together to patrol the forest to prevent poaching and logging. In 1994, the area was declared a Wildlife Sanctuary, and there were further meetings with the villagers to devise alternative fuel, fodder, and other requirements.

The Chakrashila experience demonstrates that a variety of education and awareness efforts are required in any conservation effort. These range from creating awareness about the need to conserve biodiversity, to lobbying and advocacy, to action-oriented campaigns, and education for lifestyle changes. Of critical importance here is to address girls and women, as they have much to contribute, and equally much to lose if biodiversity declines.

Diverse knowledge systems

India now faces the twin crisis of loss of biodiversity, and of the community knowledge associated with its use. For instance, Dalit. women traditionally use weeds to feed their cattle, as they do not have access to more expensive forms of feed. One such weed, Launaea procumbens, according to them is supposed to increase the milk yield of cattle, a fact attested by the Indian Materia Medica. This plant is commonly found but neither modern science nor younger farmers seem to know of its value. This knowledge of its use may well become rare, with land use changes and large-scale use of weedicides.

In the Western Ghats, the general degradation of forests and conversion of natural areas to fields or urban lands is leading to the loss of medicinal plants such as sandruk (Litsea glutinosa), and jasund (Antiaris toxicara). Traditional healers use sandruk for fractures, and jasund for treating bloat in cattle. The younger

Educating for diversity

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generation wants to move away from family occupations, and does not feel the need for going to traditional healers. With few takers of traditional healing systems, knowledge of medicinal plants will die as the healers pass away.

In the late 1980s, two young women who had just finished veterinary training, started the NGO Anthra in Pune and Hyderabad. They found that the problems that communities face with regard to livestock, posed challenges that went far beyond their veterinary skills. Veterinary college curricula are indifferent to community knowledge about livestock management, feeding systems and traditional medicine.

Anthra's work, which has evolved from this background, now involves documentation of traditional livestock practices, fodder and forage species, and medicinal plants used for treating livestock. The NGO validates traditional practices and then trains village animal health workers in these practices, which are used to cure simple ailments. More complex ailments are referred to the hospital. Veterinary hospitals are few and far between, and Anthra finds that no single medicine system can provide all healthcare answers. They feel that solutions lie in understanding local systems and building on their strengths.

Anthra is, in a sense, learning from traditional knowledge, and coherently combining this with formal systems to better the lives of the communities they work with. This means that traditional knowledge has to understood keeping in mind the historical context and then integrated in environmental restoration programmes in the current context. In the Biligiri Rangan Hills of Karnataka, the Vivekananda Girijan Kalvan Kendra in its school for the Soliga tribals, combines the formal Rs. three with forays into the forests. continuing the powerful oral tradition of teaching in the field. In the process, the children do not get alienated from their cultures and

In descending order:

- 1. Nature orientation for school children, Maharashtra.
- 2. Youth mobilisation against hunting, creating public awareness.
- 3. Nature camps establish links between nature and people, otherwise missing in urban
- 4. Hundreds of school children gather to seek the protection of the tiger, at Ranthambhor,









their natural surrounds, a process that is tragically happening whereever formal educational curricula devised in State and national capitals are thrust upon diverse ethnic communities.

How will the lessons from these examples become part of school/college curricula, research and government policy? The challenge goes far beyond formal education curricula; it extends into creative awareness and training programmes for policy makers, bureaucrats, the legal fraternity, agriculture university staff, NGOs, gram sevaks, and others who have an impact on how biological diversity is conserved and used.

The Anthra experience also shows that there is diversity of knowledge, specific to ecosystems, communities,

gender and age. Members of the community - healers, men, women, older and younger folk - have different roles and therefore different knowledge bases. As roles change, as people get "mainstreamed" and as the younger generation moves away from traditional occupations, these knowledge systems are getting lost. Even where interested, the younger generation lacks confidence in traditional knowledge systems, which can be attributed to biases in formal education curricula. Community knowledge is disregarded as having no scientific basis, and has no place in formal curricula.

In Lakshadweep, the NGO
Kalpavriksh, while conducting
teacher training workshops on the
environment, found that children

could recognise an astounding 200 species of marine fish . . . but that this skill had no place in the formal school education. In the Andaman and Nicobar Islands, the problem was different; school teachers, most of them settlers from the Indian mainland, had never ventured into the sea around them, and were astounded when they were taken snorkelling. Their training had never told them about the delights of a coral reef, so near to them . . . and in turn, they would never have conveyed this to the students, had an innovative programme by Kalpavriksh not brought them close to the sea and the reef.

The U.N. Convention on Biological Diversity provides for respect and maintenance of traditional systems of resource use, the need to take



permission of local communities before using these systems for outside benefit, and the need to equitably share with them these benefits. A critical implication is that formal education must change to give equal importance to traditional modes of thought, knowledge systems and practices. In the village of Mendha (Lekha), Gadchiroli district of Maharashtra, this is being achieved by village-led abhyas gat (study cirles), in which topics of research and enquiry are initiated by villagers, and outside "experts" called by these villagers present their information and ideas. Together, the locals and the outsiders evolve a deeper understanding from various perspectives, and this understanding is then used by the gram sabha to take informed decisions.



Unfortunately, even though there are hundreds of such examples of creative, educational, research and training initiatives, the spread in India is still very minimal. Systemic changes in formal education and training are needed to make impacts at the scale and speed required for the size and diversity of India.

An educational strategy for India

The very diversity of our country poses a challenge: while an educational programme or material might work in one region in one set of circumstances, it would not be applicable in another. Also, no one group can develop educational material for all the different situations in India. Therefore, a different concept of design needs to be explored. The saree provides an interesting analogy.

The saree is a designed piece of clothing. Over the years, beautiful designs, patterns and textures have been printed and woven into the saree, and yet, several thousands of years of Indian history has not tried to stitch the saree. It is worn in many ways and fits all sizes. It is equally good for working, dressing up or sleeping in. The final effect is the combined effort of the person who designs the cloth and the person who wears it - of the designer and the user. This is a very different concept from that of designing, say, a well-stitched dress. This garment either fits or doesn't fit, and where it fits, leaves little scope for the wearer to be innovative in its use.

Our educational designing has to be somewhat like the saree, more a tool than a finished product, a tool that comes alive in the hands of the teacher, its application being the combined effort of the designer and the user.

In essence, the challenge is to help our education system become flexible and adaptable enough so as to allow for a diversity of situations, approaches and content, and to equip the teacher to recognise this diversity as an opportunity for biodiversity education. The premier decision-making institutions in India, such as NCERT and UGC, would do well to imbibe this principle, and to make the system much more sensitive and responsive to local ecological and cultural situations.



Developing sitespecific material

he Centre for Environment Education (CEE), Ahmedabad, contains a facility called the Environment Education Bank (EE Bank). This bank contains environmental education activities, case studies, access information to books, magazines and periodicals, details of people and copyright-free, easily reproducible illustrations. The EE Bank is accessed through a training workshop, and is a tool to help educators develop their own educational material suited to their own situation or school. Over the years, several hundred school teachers, and government and non-government agencies have used the various components of the EE Bank, to develop activity handbooks for teachers, field guides, scripts for dramas, radio and television programmes, and so on. One of the latest is a bird observation book for Pune, being developed by Kalpavriksh and CEE, which will use bird illustrations from the EE Bank.

The EE Bank is an example of a tool that can help formal education become diverse, need-specific and non-prescriptive.

Hopefully, the ongoing National Biodiversity Strategy and Action Plan, will re-focus the country's attention onto such tools and methods, evolve a critical understanding of the problems with the current educational system, and advocate both "deschooling" (unlearning the anti-diversity, monocultural system that is fed to schools and colleges), as also other innovative alternatives. A specialist working group is currently preparing an action plan on Biodiversity Education and Training, and this theme is a strong focus in several local site plan processes, such as that at Uttara Kannada. Karnataka.

> Kartikeya V. Sarabhai and Sanskriti R. Menon

WTO: a right denied

Ashish Kothari

Farmers shout anti-government slogans in Chandigarh demanding that the government withdraw from its WTO agreement. Some hold portraits of freedom fighter Bhagat Singh also a farmer - hanged during British rule.



emember the Dunkel draft, or GATT? In the early 1990s, these words were at the centre of an explosive national debate. It denoted the emerging face of the international trade system, and the thrust of industrial countries to promote one legally binding regime that would apply to all countries. In 1995, over 100 countries entered into such a regime, meant to remove trade barriers and, in theory, promote economic development across the globe. Several different agreements - on agriculture, on tariffs, on subsidies, on sanitary measures, and on intellectual property rights - came under one roof, the World Trade Organisation (WTO). Initially resistant, the Indian government finally gave in and joined the regime.

Just over half a decade later, the widespread controversy that preceded the coming into force of the WTO, the debates that made "Uncle Dunkel" a

favourite whipping boy, are back again. On April 1, the Indian government lifted "quantitative restrictions" (QRs) on over 700 items of industrial, agricultural and domestic products. In 2000, it had already lifted such barriers on several hundred other items. Suddenly, the economy, sheltered by customs duties and restrictions of various kinds, has been opened up to a flood of cheap goods that will be the delight of the urban elite consumer class, but the despair of tens of millions of farmers, fisherfolk, tribals and small manufacturers. Promises of continued protection, simultaneously made by the government, appear to be more a cruel All-Fools Day joke than a long-term measure of security.

What does the WTO do? It forces countries to open up their economy to a virtually free flow of imports and exports, controls on which are increasingly removed. It denies countries the right to protect their fledgling or weak industrial and agricultural sectors. And in the context of this issue, it compels countries to ignore, or weaken as deliberate policy, the controls that are so essential to protect natural environment and people's lives that are dependent on this environment.

International trade has conventionally been destructive of biodiversity and people's livelihoods, by encouraging over-exploitation of natural resources, creating pollution through increasing transportation, habitat loss by infrastructure development, and so on. WTO did not create such impacts, but it will greatly enhance them. This it is will do by forcing countries to:

- relax export rules that to date prohibit or restrict the exploitation of forests, fisheries and minerals, encouraging, for instance, destructive shrimp aquaculture along coasts or the unrestricted export of medicinal plants;
- rencourage export policies that spread monocultures (single-species plantations), e.g. of flowers, exportoriented cash crops, and a handful of market-favoured crop varieties:
- relax import rules that control the unhindered dumping of all kinds of products, including polluting and

hazardous wastes and exotic species/varieties of plants and animals that could wipe out indigenous species;

- adapt intellectual property rights regimes (through the Trade Related IPR agreement or TRIPs), including compulsory patents on microorganisms, that are inappropriate to local conditions, increase the piracy of biodiversity and indigenous knowledge, and will relegate farmers to secondclass citizenship by providing huge sops to seed corporations;
- accept with few conditionalities, investment in several sectors by foreign industrialists and firms, with little regard for its ecological and social impacts.

The WTO does have some "safety" clauses which allow countries to impose restrictions and conditions based on public health, environment, or ethical reasons. However, these are generally lost under the sheer weight of the free trade verbiage, and it has proved rather difficult for countries to deny liberalisation using such reasons. The Indian Government has promised to use these and other discretionary powers to safeguard the country's interests . . . but all indications are to the contrary and indeed, it seems that the country is in a hurry to abide by most of the WTO conditions well before we even need to. Since the early 1990s, a combination of the IMF-World Bank influenced "globalisation" process and the WTO-dictated measures on import-export, have increasingly driven India's natural environment and the people who live on this environment, to the edge of a precipice. The only hope is the widespread resistance, in India and across the world, from farmers groups, NGOs, fisherfolk associations, and many sensitive governments, to the imposition of the WTO.

In the final analysis, the WTO juggernaut can only be defeated through such resistance, coupled with the use of other international agreements such as the Convention on Biological Diversity, and initiatives towards more self-reliant production systems based on biodiversity. ecological sustainability, and social

justice.



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